



INFRA-RED
THERAPY

BURDICK

Price List of Burdick Infra-red Generators

(An appreciable saving is effected by purchasing in unbroken sets)

Compress Set, consisting of:

| | |
|--|-----------|
| C-1 Infra-red Compress | (\$26.00) |
| C-2 Infra-red Compress | (36.00) |
| C-3 Infra-red Compress | (40.00) |
| P-53 Infra-red Pad (Operable from Potentiometer) | (26.00) |
| CP-100 Potentiometer | (28.00) |

\$150.00

Pad Set, consisting of:

| | |
|--|-----------|
| P-50 Large Infra-red Pad with two circuit cord switch and thermostat | (\$31.00) |
| P-51 Small Infra-red Pad with cord switch | (16.00) |
| P-52 Spinal Infra-red Pad | (20.00) |

\$65.00

Rectal Set, consisting of:

| | |
|----------------------------|-----------|
| OD-1 Small Rectal Dilator | (\$ 4.75) |
| OD-2 Medium Rectal Dilator | (5.25) |
| OD-3 Large Rectal Dilator | (5.75) |
| OD-4 Colonic Applicator | (10.00) |
| OD-5 Storke Fistula Probe | (5.00) |
| OP-102 Potentiometer | (28.00) |

\$55.00

GU Set, consisting of:

| | |
|---------------------------------|-----------|
| GU- 1 Urethral Applicator | (\$ 9.00) |
| GU- 2 Urethral Applicator | (9.50) |
| GU- 3 Urethral Applicator | (10.00) |
| GU- 4 Prostatic Applicator | (5.00) |
| GU- 10 Small Vaginal Applicator | (4.00) |
| GU- 12 Large Vaginal Applicator | (5.00) |
| GU- 13 Cervix Applicator | (9.00) |
| GU- 14 Cervix Applicator | (9.50) |
| GU- 15 Cervix Applicator | (10.00) |
| OP-102 Potentiometer | (28.00) |

\$95.00

Eye, Ear, Nose and Throat Set, consisting of:

| | |
|---|-----------|
| P-51 Small Infra-red Pad with cord switch | (\$16.00) |
| OD-5 Storke Fistula Probe | (5.00) |
| NA-1 Nasal Applicator | (3.25) |
| OA-1 Aural Applicator | (14.50) |
| OP-102 Potentiometer | (28.00) |

\$65.00

Complete Orificial Set, consisting of:

| | |
|--------------------------------------|-----------|
| OD- 1 Small Rectal Dilator | (\$ 4.75) |
| OD- 2 Medium Rectal Dilator | (5.25) |
| OD- 3 Large Rectal Dilator | (5.75) |
| OD- 4 Colonic Applicator | (10.00) |
| OD- 5 Storke Fistula Probe | (5.00) |
| GU- 1 Small Urethral Applicator | (9.00) |
| GU- 2 Medium Urethral Applicator | (9.50) |
| GU- 3 Large Urethral Applicator | (10.00) |
| GU- 4 Prostatic Applicator | (5.00) |
| GU-10 Small Vaginal Applicator | (4.00) |
| GU-12 Large Vaginal Applicator | (5.00) |
| GU-13 Small Cervix Applicator | (9.00) |
| GU-14 Medium Cervix Applicator | (9.50) |
| GU-15 Large Cervix Applicator | (10.00) |
| NA- 1 Nasal Applicator | (3.25) |
| OA- 1 Aural Applicator | (14.50) |
| Velvet Lined Carrying Case | (36.50) |
| Built-in Potentiometer and Voltmeter | (55.00) |

\$200.00

INFRA-RED UNIT PRICE LIST

(Prices are exclusive of Potentiometer)*

| | |
|--|---------|
| C- 1 Infra-red Compress | |
| C- 2 Infra-red Compress | \$26.00 |
| C- 3 Infra-red Compress | 36.00 |
| P-53 Infra-red Pad (Operable from Potentiometer) | 40.00 |
| CP-100 Potentiometer | 26.00 |
| P-50 Large Infra-red Pad with two circuit cord switch and thermostat | 28.00 |
| P-51 Small Infra-red Pad with cord switch | 31.00 |
| P-52 Spinal Infra-red Pad | 16.00 |
| OD-1 Small Rectal Dilator | 20.00 |
| OD-2 Medium Rectal Dilator | 4.75 |
| OD-3 Large Rectal Dilator | 5.25 |
| OD-4 Colonic Applicator | 5.75 |
| OD-5 Storke Fistula Probe | 10.00 |
| GU-1 Small Urethral Applicator | 5.00 |
| GU-2 Medium Urethral Applicator | 9.00 |
| GU-3 Large Urethral Applicator | 9.50 |
| GU-4 Prostatic Applicator | 10.00 |
| GU-10 Small Vaginal Applicator | 5.00 |
| GU-12 Large Vaginal Applicator | 4.00 |
| GU-13 Small Cervix Applicator | 5.00 |
| GU-14 Medium Cervix Applicator | 9.00 |
| GU-15 Large Cervix Applicator | 9.50 |
| NA-1 Nasal Applicator | 10.00 |
| OA-1 Aural Applicator | 3.25 |
| Velvet Lined Carrying Case | 14.50 |
| Built-in Potentiometer and Voltmeter | 36.50 |
| OP-102 Potentiometer for Orificial Applicators | 55.00 |
| | 28.00 |

*Note: The prices quoted on C-1, C-2, C-3 and P-53 do not include Potentiometer. A CP-100 Potentiometer should be ordered for use with these appliances.

The Orificial Instruments may all be operated interchangeably from either the OP-102 or the carrying case built-in Potentiometer. Neither of these controls is included in the prices of Orificial Instruments quoted above, so if you do not have the carrying case with the built-in Potentiometer, an OP-102 should be ordered.

Complete set of Infra-red Appliances consisting of the entire Orificial Series in velvet lined carrying case with built-in Potentiometer and Voltmeter, the entire Compress Series with CP-100 Potentiometer and the entire Pad Series\$400.00

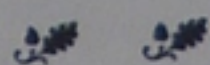
BURDICK CABINET COMPANY
Milton, Wisconsin

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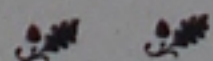
INFRA-RED THERAPY



*A Practical Manual
of
Invisible-Light Therapy*

BY

F. F. BURDICK



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1923

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INTRODUCTION

Medical practice has always recognized the value of heat in the treatment of disease. Hot water bottles, heated irons, pads, etc., have long been used with some good effects.

The difficulty has been that the conductive heat so produced is not penetrative to any appreciable degree, and is rapidly dissipated by the vascular system.

The ability of Light to penetrate is one of its most valuable qualities in Light Therapeutics. A ray of Sunlight penetrates the earth's crust until completely transformed into heat, warming the earth to a considerable depth; it penetrates body tissue, generating a constructive and stimulating warmth.

Now just what is the force, in Sunlight, that has such an important part to play in the progress of vegetable growth and of animal (and human) metabolism?

Sunlight, in terms of the spectrum, consists of 7% Ultra-violet Rays (invisible), 13% Visible Rays, and 80% Infra-red Rays (invisible). Since the Ultra-violet Rays in Sunshine are practically screened out by atmospheric obstructions, such as dust, and by the protective tan which the skin develops when exposed to the Sun's rays, and since the remaining Sunshine from which we derive so much benefit is composed of 80% Infra-red Rays, and only 13% Visible Rays, is not the proposition that Infra-red Rays are beneficial a logical hypothesis on which to base our further investigations?

Scientific investigators have proved that the deep-penetrating, bland, reconstructive heat rays are the invisible, Infra-red Rays. Clinical work with these rays is yet in its infancy, but already the results obtained indicate that the Infra-red will surpass all other methods of Light Therapy and will be employed with beneficial and gratifying results in a large class of important cases where their use is especially indicated.

For some time the efforts of trained investigators in the Research Laboratories of the Burdick Cabinet Company have been directed exclusively toward the development and perfection of appliances which will enable the physician to employ these rays in a convenient and practical manner. Their perfection is, in our opinion, one of the most important scientific facts of the decade.

The story of Infra-red is one of Nature's most thrilling tales; and the scientific production of the rays, as set forth in these pages, and their important uses in modern methods of treatment, form a most interesting chapter in medical history.

In presenting the subject of the Infra-red Rays, it has been the author's plan to cover fully the questions most frequently asked thus giving, in the most analytic manner possible, just the information desired by the physician.

A sufficient analysis of the subject has been made in this book to establish the basis for a practical working technique in the hands of the practitioner. The Service Department of the Burdick Cabinet Company will be glad to answer any questions that may develop, regarding any phase of the subject, and will be especially grateful for suggestions and clinical reports that may be helpful to other medical workers.

I

What the Infra-red Rays Really Are.

The Infra-red Rays are those long wave length, deeply penetrating rays of Radiant Energy which occupy an extensive section of the Light spectrum.

Sunlight consists of 80% Infra-red (invisible), 13% Visible Rays and 7% Ultra-violet (invisible).

As shown by the ample quotations and references in this treatise, these Infra-red Rays have little thermal effect on the skin, but penetrate to the deeper tissues where they are converted into heat; not intense or destructive, but mild, heat which has a regulatory action on the circulation and which may be applied for prolonged periods without discomfort to the patient.

*Relieving A
Case of
Neuritis*

The remarkable flexibility of the Burdick Infra-red Compresses makes them easily adaptable to the contour of any part of the body, held firmly yet gently in position, giving PERFECT COMFORT to patient for "Mild Prolonged" as well as "Short Intensive" applications.

No other method for local application of RADIANT ENERGY is at all comparable with the universal flexibility of the Infra-red Compresses for all branches of medical practice.



To produce Infra-red to the exclusion of other rays, it is essential that they be produced in what physicists term a "perfect black body." This has been the main obstacle to their general production and use up to the present.

By the application of a simple law of physics the Burdick Laboratories have developed a "perfect black body" which produces the Infra-red Rays by connection to any electric light socket, 105 to 120 volts, either A.C. or D.C.

This apparatus, described farther on, is so simple and yet so effective that we venture to predict the universal use of the Infra-red Rays at a very early date.

Lumbar Application for Reflex Inhibitory Effects

The soothing, pain-relieving effects of the Burdick Infra-red Pads are extremely gratifying to both physician and patient.

The Pad Series are provided with reliable thermostats so that the physician may prescribe them for his patient's use in the home—with absolute safety.



II

Some of the Physiologic Actions of the Infra-red rays; Their Recognized Value in Medicine.

1. **Deep Penetration:** That the long Infra-red Rays are deeply penetrating is a fact well established in physics. In fact, the entire progress of the Sunlight Spectrum from the shortest waves, the Ultra-violet (which scarcely penetrate the first layers of the skin), to the longest Infra-red, is toward greater tissue penetration.

The following quotations attest to the general acceptance of this important physiologic action of the Infra-red Rays:

"Infra-red Rays are long rays and are deeply penetrating."—Thederling-Munch. med. Woch. Jan. 17, 1919.

H. J. Gerstenberger, M.D. and C. T. J. Dodge, M.D., ("The Use of Radiant Heat—Light—in the Treatment of Otitis Media."—American Journal of Diseases of Children; October, 1922, Vol. 24, pp. 320-326), say: "Whether, however, the rays of longer wave lengths, especially those on the red and Infra-red side of the spectrum, have any further specific effect in addition to *this power of causing the deep hyperemia by deep penetration*, remains at present an unanswered question."*

"Yellow, Red and Infra-red Rays deeply penetrate human tissues."—Nagelschmidt, ("Lichtbehandlung"), Aug. 16, 1920. Sonne, of the Finsen Institute, Copenhagen, Denmark, announces that 100 per cent Infra-red Rays applied to the human body were absorbed—transmitted into the deeper tissues and converted into heat—while at least 35% of all visible light was reflected, and hence not absorbed.

*The italics are the author's.

With 100 per cent absorption of the Infra-red Rays by the human tissues, large volume of energy radiations means deeper heat production and hyperemia than are obtainable by rays which are only partially absorbed.

(a) Increased vascularity of deep tissue structures.

Lille believes that the Infra-red Rays are superior to all other rays of the spectrum in respect to their penetrating power and hence their regulatory action upon the circulation.

Deep penetration of the Infra-red Rays exerts marked influence upon the blood-vessels in the deep tissues, particularly noticeable in the joints and articular surfaces.

The "Mild Continuous" method of application is particularly favorable for producing increased vascularity of the tissues in cases of arthritic oedema of the joints, stimulating increased absorption and repair of broken down tissues.

No other method of local application is at all comparable with the efficacy of Infra-red Compresses for these "Mild Continuous" applications, inducing, under full control, increased circulation through any particular area under treatment.

Familiar illustrations of the *Penetration* of the Infra-red Rays are ever before us in Nature. The earth, frozen to the depth of several feet, is quickly penetrated by the Infra-red Rays in springtime, and warmed for the growth of vegetation, almost to the day, in the rotation of the seasons.

2. Vital Stimulation: The Infra-red Rays are undoubtedly the most vital stimulants of the spectrum. While all groups of therapeutic rays possess distinct values as stimulants, it is the Infra-red Rays that awaken dormant vegetation in springtime and energize animate creation to growth and action.

On this very point, Steinmetz remarks: "Where intense radiation is intercepted by a body, chemical action may result from the heat energy into which the radiation is converted. The action of the Infra-red radiation on plant life seems to be a chemical action, and this would be the most

**Position for
Relief of Lobar
Pneumonia**

"Short Intensive" applications produce rays of short wave lengths but of greater intensity, giving best results for superficial stimulation and hyperemia — pulmonary, gastric, pelvic, renal, etc.

"Mild Prolonged" applications stimulate reabsorption of exudates and breaking up of consolidation.



important of all chemical actions, as upon it depends the life of all vegetation and hence of animal life and thus of our lives."—Steinmetz, "Radiation, Light and Illumination."

The "chemical action" of the Infra-red Rays upon plant life is easily proved. Plant such common seeds as beans or corn in two boxes of earth with equal soil conditions. Place one box in Sunlight and the other in darkness. Give both boxes equal advantages as to moisture and heat, and observe results.

Seeds in both boxes will grow until the little plants in the darkness have consumed the energy stored in the parent seed to nourish them until they could get food for themselves. Then, if left in the darkness, they will die. But bring them into the Light, and this "chemical action" takes place. The organic colloids become active, pigment cells are formed, and the little plants are able to build themselves (organic substance) out of the inorganic material about them—soil, air and water.

The influence of Infra-red Rays upon vegetable cells is well known to biologists; the physiologist tells us that these same Light Rays are capable of influencing the metabolism of our own bodies, accelerating all the nutritive processes to greater and healthier action.

Proof of this is seen in the history of the aborigines, whose nude bodies were bathed daily in the Sun's rays and who knew disease no more than did the beasts of the primeval forest—this despite lack of sanitation and of artificial protection against disease.

Their application to sluggish pathologic tissue is, perhaps, the most vital influence possible to apply to normal functioning in hastening the processes of repair in all traumatic or infectious lesions.

Technique for Relief of Trauma

"Mild prolonged" applications produce the "long wave" Infra-red Rays for deepest penetration, with intensive heat production—cellular massage—increased vascularity—in the deep tissue structures.

The Compress is light, provides uniform air space around the part under treatment, and can be worn by the patient with perfect comfort, while in bed, for hours or even days continuously.



(a) Vasomotor stimulation and regulation.

The marked influence of the Infra-red Rays applied to a considerable area of skin, thus acting upon the peripheral nerve endings of the vasomotor system, is recognized by physiologists. For obtaining this effect,

the large Infra-red Generator for office treatments is especially indicated, as large portions of the body at a time may be treated.

(b) Increased leucocytosis, with accelerated catabolism and anabolism.

No other method of local application is perhaps quite so well adapted to maintaining a steady, continuous, active blood supply to any diseased area under treatment as is the application of the Infra-red Rays by means of the Burdick Compresses and Pads.

When short, intensive applications by means of the ordinary media are made to the area of a traumatic lesion, the increased hyperemia which results is often lost in a few hours by the mechanical reaction which takes place after the stimulus of these intensive applications has passed.

By means of these local Applicators, applications of Infra-red Rays, penetrating the deep tissues, are controlled in such a way as to maintain a uniform bathing of the tissues by the blood and lymph streams to just the degree essential for best repair work, for hours, days, or even weeks without interruption.

***Treating
Articular
Rheumatism
Under Control***

The accurately calibrated Potentiometer provides perfect control for "Short Intensive" or "Mild Prolonged" applications, with absolute safety to patient and bedding.

This calibrated control establishes prescription writing not common to medical appliances.



(c) Deep, active hypermia—both as a means to derivative action and of increased inflammatory processes.

The easy adaption of applicators to all portions of the body, and with special convenience to the extremities, renders Infra-red appliances of greatest value as derivative agents, depleting congested areas through the circulatory system into the feet and limbs, or cutaneous areas, and thus relieving inflammation and pressure in any internal region.

Likewise, the Infra-red Instrument series are all peculiarly adapted to producing the increased inflammatory processes essential to phagocytosis and repair for internal infections or traumatic lesions.

The Infra-red instrument for carrying the rays to focal infections or other lesions in the various cavities, for bactericidal action or cellular stimulation, is of special importance.

3. **Sedation:** As an analgesic agent, the Infra-red Rays, properly applied, have a marked sedative action scarcely equaled by any other means. By derivative action, inflammatory processes are relieved and nerve pressure correspondingly lessened by applications of the Burdick Infra-red Compresses and Pads.

"Mild Prolonged" applications of the Compresses and Pads also have a peculiar inhibitory action in lessening nerve sensibility, functional activity of over-worked organs, and traumatic lesions, giving most excellent results in relief of pain and discomfort. Applications may be made for these inhibitory effects by all applicators in the Infra-red series.

Nagelschmidt says: "The Infra-red Rays have a sedative effect, causing paling of inflammation, regression of oedema, drying of secretions and improvement of suppuration. The effect upon pain is invariable. In cases of rheumatism and arthritis, pain disappeared permanently. Cases of paraesthesia were frequently cured."—("Lichtbehandlung"); Aug. 16, 1920.

Too, these "Mild Prolonged" applications are very efficacious in burns, contusions, orchitis and epididymitis, surgical wounds and various traumatic lesions.

Congestions of various types associated with lowered vitality especially indicate these "Mild Prolonged" applications either for direct stimulation and tonicity, or indirect derivative action. The "Mild Prolonged" irradiations over the body take the extra load off the lungs, heart, kidneys, etc., and at the same time relieve those obscure neuritic pains usually accompanying anemia and convalescence. Gastric, pelvic, splanchnic, renal, and articular congestions and pain are rapidly relieved, and especially good results may be expected in ovaritis, cystitis, and derangements in general of the female genitalia.

The immediate effects produced by "Mild Prolonged" irradiations of Infra-red Rays are sedative and soothing combined with mild but pronounced deep-cellular stimulation—mild active hyperemia maintained indefinitely under close control.

4. **Experiments and Conclusions:** A delicate thermometer with blackened bulb was thrust into a heavy, deep roast beef, the latter being about four inches from an Infra-red generator, which was kept at 212 de-

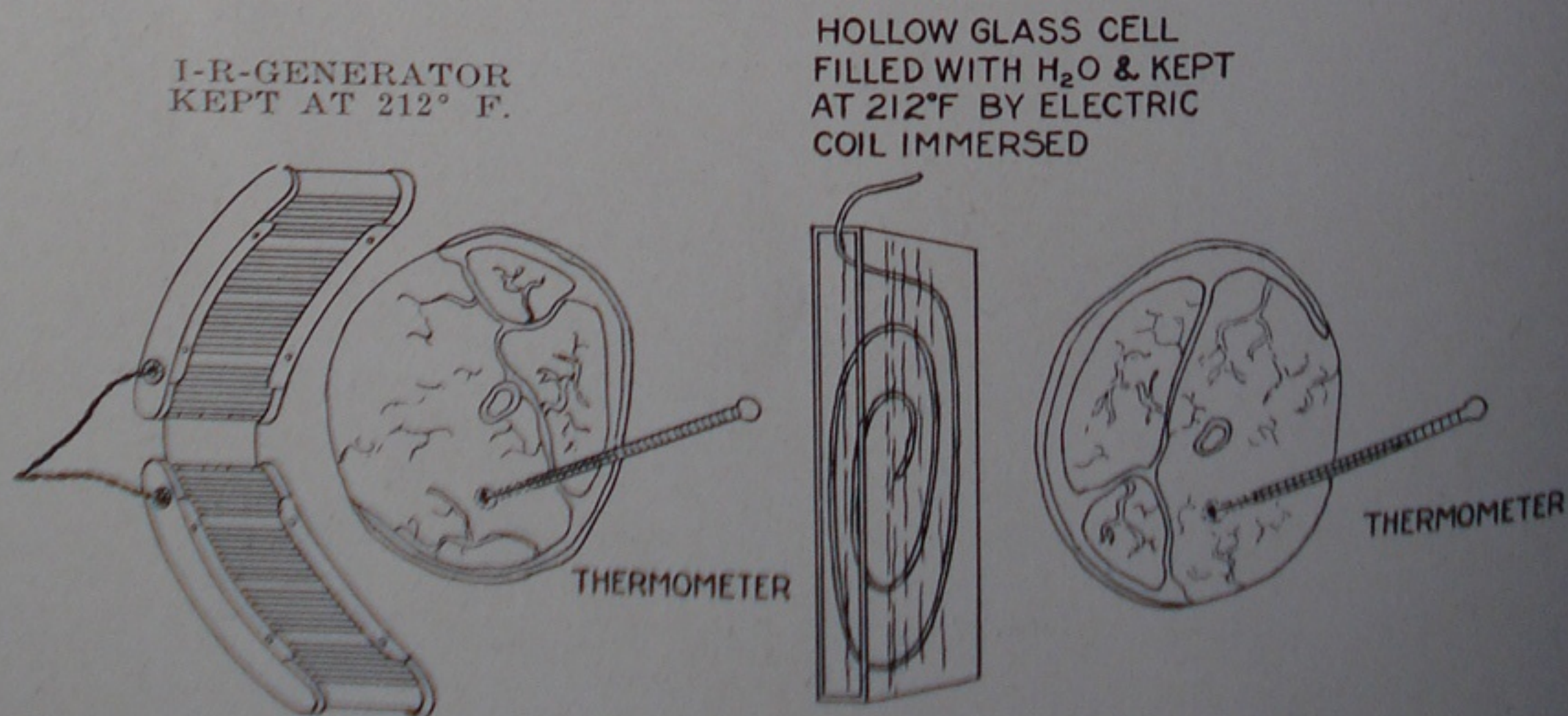


Figure A
Experimental proof of Infra-red penetration. For full explanation, see page 9.

degrees F. (100 degrees C.) At the end of two hours the temperature shown by the thermometer was 103.3 degrees F. (See Figure A.)

At the same time, another beef roast of the same weight, dimensions and temperature was treated in the same manner as in the previous experiment with the exception that water in a glass tank, kept at 212 degrees F. by a coil of resistance wire suspended in the tank and connected to the street circuit, was used in place of the Infra-red generator.

At the end of two hours the temperature indicated by the imbedded thermometer was 101.4 degrees F. (See Figure A.)

This was a decided, careful test and demonstrated conclusively the permeability of animal tissue to Infra-red Rays and the latter's conversion into heat in the deeper tissues. The glass cell gave off no Infra-red Rays and hence fewer heat producing rays were passed into the animal tissue.

A delicate thermometer reading to 1-10 of one degree C., with the bulb painted a dead black, was introduced into the mouth of a young man aged 22. It was placed between the teeth and the cheek. The young man was of the anemic and atonic type and one in whom a subnormal temperature would naturally be expected. At the end of thirty minutes the thermometer showed 36.63 degrees C. (97.93 degrees F.) The Infra-red Compress was then held six inches from the patient's face and, the current being turned on, thermometer readings were taken at certain intervals. The record showed as follows:

| | C. | F. | | | C. | F. | |
|------------|--------------------|-------|----------|------------|-------|-------|----------|
| 1:40 p. m. | 36.63 | 97.93 | (Normal) | 3:15 p. m. | 37.00 | 98.6 | (Normal) |
| 2:10 p. m. | 36.63 | 97.93 | | 3:20 p. m. | 36.90 | 98.42 | |
| 2:40 p. m. | 37.00 | 98.6 | (Normal) | 3:35 p. m. | 36.80 | 98.24 | |
| 2:50 p. m. | 37.10 | 98.77 | | 3:40 p. m. | 36.85 | 98.33 | |
| 3:00 p. m. | 37.15 | 98.87 | | 3:45 p. m. | 36.75 | 98.15 | |
| 3:05 p. m. | 37.20 | 98.96 | | 3:50 p. m. | 36.67 | 98.00 | |
| 3:10 p. m. | Withdrew generator | | | | | | |

This experiment proves conclusively that the local temperature at the focus of the Infra-red Rays was raised appreciably. On closer contact of the generator, the thermometer would undoubtedly have shown further temperature increase.

Relieving Frontal Sinus Infection; Cold in the Head

(Infra-red Pad P-51).

The comfort and relief afforded by the P-51 Infra-red Pad in sinus infections, cold in the head, tooth ache, and various facial neuralgias make it an important part of sick room equipment as well as of the well equipped office. In case of severe and persistent pains in the head the C-2 compress should be used, applied to the lower limbs as a derivative agent to deplete the congested areas by drawing the blood to the extremities and thence into general circulation.



III

The Difference Between Therapeutic Value of the Infra-red Rays and That of Other Portions of the Spectrum Used in Medicine—Visible Light, Ultra-violet Rays, X-Rays, and the Gamma Rays of Radium.

1. The Spectrum—General Characteristics: The lowest temperature Infra-red Rays used for medical purposes are 3100000 Å. U. in length, while the shortest Gamma Rays at the far end of the spectrum are .2 Å. U. in length.*

Between these limits—the longest Infra-red Rays and the shortest Gamma Rays—are groups of energies both physical and chemical, permitting of a wide range of Physiologic and Therapeutic application.

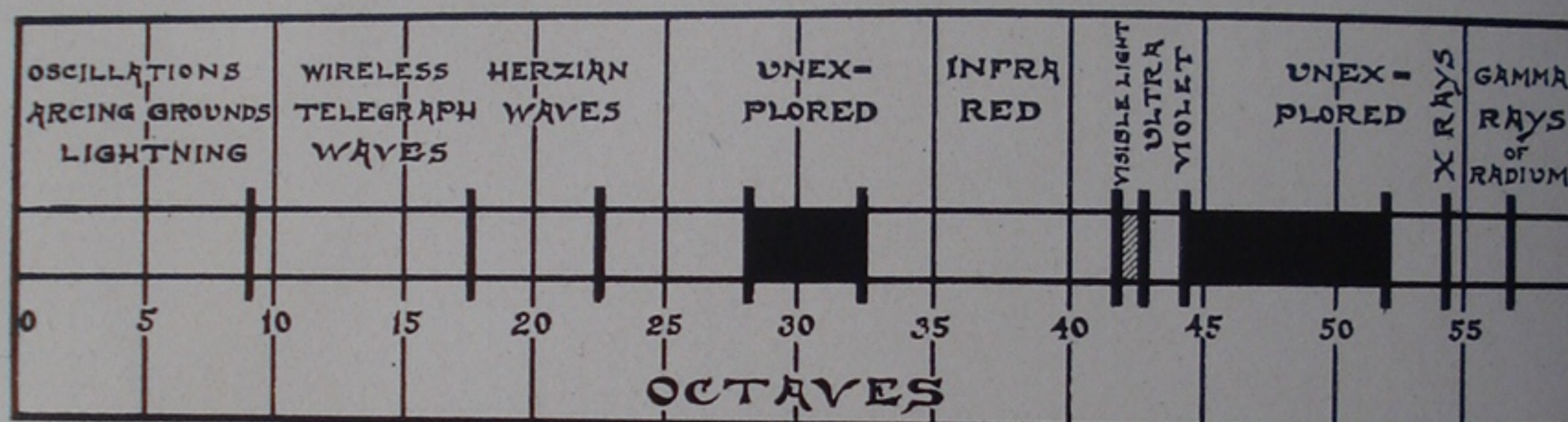


Figure B

Group of Spectrum Radiation

A careful study of this diagram reveals the important place the Infra-red Rays occupy in the Spectrum of Radiant Energy.

The invisible sections (Ultra-violet, Gamma and X-rays) to the right of the visible spectrum, with which we are so familiar in medical practice, are no more truly light rays, nor are their physical and therapeutic qualities more valuable than the less known, Infra-red Rays to the left of the visible spectrum, when once properly understood.

In other words, in the use of *Light Rays* (visible or invisible), we are dealing simply with *Energy*. The portion of the spectrum from which we draw this *Energy* determines its physical and chemical properties and hence its therapeutic application.

There is nothing mystic or strange about Light Therapy. The whole subject is simply a study of Nature—her forces and how they work in vegetable and animal life—and the scientific application of these natural laws in medical practice.

In medicine, as in Nature, these forces (light rays) blend or correlate harmoniously and constructively. Hence, no one class of light rays displaces or clashes with any other group. Scientifically employed, all supplement one another in medical uses the same as in the daily phenomena of Nature—the growth of plants, the blooming of flowers, and the ripening of fruit.

The harmonious action observed in the combined use of the various groups of Light Rays is also experienced in their use in conjunction with drugs and other medicinal agencies. Light applications, through accelera-

* $\mu = .001$ Millimeter. 1 Å.U. = .0000001 M.M.

tion of assimilation, absorption, combustion, elimination and other vital processes, greatly enhance the normal action of many if not all drugs. This fact, well established by scientific proof, places Light Therapy in joint partnership with other rational medical methods and makes of it a friendly helper to general practitioner, specialist and surgeon alike.

2. **Sunlight:** It is interesting to note once more the proportion of the Infra-red in the Sunlight provided by Nature to sustain life and growth—both animal and vegetable.

| | | |
|--------------------------|------------------|-----------------------------|
| Infra-red (invisible) | Visible Light | Ultra-violet (invisible) |
| 80% | 13% | 7% |

Everyone has seen vegetables sprouting in a cellar, and who could have failed to note that, as the sprouts gained in length, they always reached to the light; and that the portion touched by the Sunlight was always greener, fresher and healthier than the untouched portion? It is a self-evident fact, then, that there is some substance, or power, in Sunlight which has to do with growth, metabolism, and pigmentation; and, as we have seen that Sunlight is composed largely of Infra-red radiation, that is, that only one-seventh of the entire energy given to us by Sunlight is visible, and 80% is infra-red, it seems logical to conclude that Infra-red radiation is that power. As the human race has been for thousands of years acclimated to and energized by Sunlight, we cannot be far wrong in concluding that the Infra-red section of the spectrum is a most important spectral factor in the treatment of various pathologic conditions.

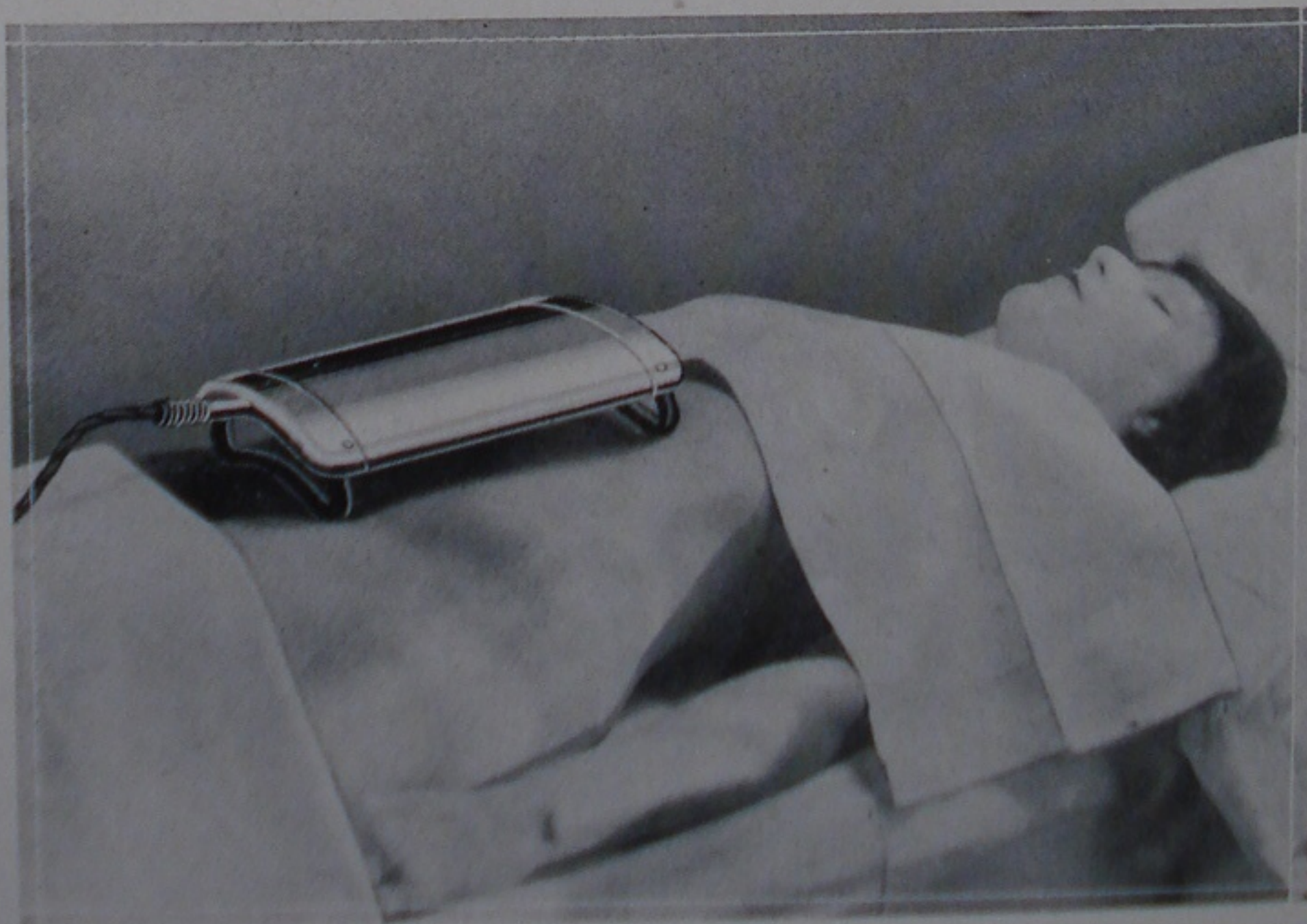
3. **Infra-red Portion of Spectrum:** Cleves, ("Light and Energy"—page 598) asserts that, "Red light of longest wave-length (*Infra-red*) is a valuable agent in combating neurasthenia. In all hyperesthetic conditions of the neurasthenic subject, the effect of the long and slow (*Infra-red*) frequencies of the red end of the spectrum not only is anodyne, but has a beneficial effect upon the general tone of the patient, with increased appetite and general regulation of digestion and nutrition. Notwithstanding their great sensibility, neurasthenic patients bear treatment with the rays (*Infra-red*) without difficulty."

Relieving Pelvic or Gastric Inflammations

(Infra-red Generator
P-53).

The P-53 pad type generator is operable from the CP-100 potentiometer used with the compress type generators. It is a part of the "compress series" as shown on "Infra-red price list."

The curved radiating surface, light weight, beautiful and sanitary finish, soft rubber supports and absolute dosage control make this appliance an exceedingly valuable medium for the local application of heat.



On calling on a tubercular patient, the physician always orders Light, and the most successful cures of tuberculosis and many diseases of metabolism are those in which the patients are exposed in a nude condition to the strongest rays of Sunlight. In this case, as the Sun's energy is 80% Infra-red, the physician has simply prescribed Infra-red Light radiation.

Dr. Evans in a recent article remarks as follows:

"If the violet end of the sun's rays is coming into favor to cure and to prevent disease, that is no reason to overlook the beneficence of the red end of the spectrum. We know that it is the Ultra-violet that kills tubercular-bacilli in street dust and on pavements and floors. We do not know what part of the ray it is that cures tuberculosis of bones and glands, and scrofula, but there is every reason to suspect that it is the red part. In heliotherapy the skin is burned to a mahogany brown as the first step in treatment. A mahogany brown skin filters out the Ultra-violet."

As a mahogany brown skin does not filter out the red end of the spectrum, and as these red and Infra-red Rays are deeply penetrating, Dr. Evans' point seems well taken.

"We do not know," he continues, "what part of the ray it is that cures up open sores and old ulcers. It may be the Ultra-violet which kills the bacteria, but it is the red end which stimulates the bed of the ulcer to heal."

Gerstenberger advocates the use of light in infections and remarks, in effect, that no other treatment is so simple, so easy to apply, or so fruitful in results. He made use of an electric bulb, and it can readily be seen that, as ordinary glass will not pass any appreciable amount of Ultra-violet Rays, the credit for these excellent results must have been due to the yellow, red and those bands of Infra-red Rays to which glass is not opaque.

4. **Differentiation of Physical and Biologic Action of Infra-red and Ultra-violet Light.** Jeune has well remarked that these two sections of the

Potentiometer Control Demonstration

The flash of light from the "pilot lamp" shows that the current is on in the Compress. Reference to the Burdick "Manual of Technique" shows the technique indicated for the particular result desired.

No other method of applying Light provides such complete and positive control, with so wide a range of technique, for varied symptoms and conditions.



invisible spectrum balance each other, using the visible spectrum as a fulcrum. That these points may be clearly shown, we furnish the appended table:

| | Infra-red | Ultra-violet |
|---------------------|--|---|
| Penetration | Deeply penetrates tissue (human); glass opaque to longer wave lengths only; quartz opaque at 8μ ; air and rock salt very transparent. | Little penetration in human tissue; practically none in blood; glass very opaque; quartz quite transparent. |
| Fluorescence | Does not cause any known Fluorescence. | Causes fluorescence in human tissues, fluorite, kunzite, etc. |
| Chemical or Actinic | Slight actinic qualities (its bactericidal effect being due to promotion of phagocytosis and similar disease-resisting natural processes.) | Highly actinic. The shorter the wave length the greater the actinic effect. |
| Wave Lengths | 8000 to 3000000 Å.U. (1Å.U.=.0000001 m. m.) | 12 to 3600Å.U. |
| Bactericidal Action | Only indirectly bactericidal through promotion of phagocytosis and definitely measured thermal application. | Highly bactericidal. |
| Phosphorescence | Causes no Phosphorescence; destroys Phosphorescence caused by Ultra-violet. | Causes Phosphorescence in various minerals. Phosphorescence neutralized by Infra-red. |
| Biologic | Principal factor in all vegetable life. Produces tissue changes through heat developed in deep tissues. | Destroys vegetable life. Tissue changes by chemical action. |

Relieving Sore Throat, Quinsy and other Affections of the Cervical Area

(Infra-red Generator P-51).

No other device or method is so convenient and effective in making heat applications to the throat as Infra-red Pad P-51. It may be used most effectively as adjuvant treatment with any indicated ointment, moistened compress or other medication.

The P-51 is convenient and inexpensive and may be prescribed for your patients' use in the home as well as for office treatments.



IV

Infra-red Rays Distinguished from Mere Heat Waves.

1. **Reasons for Confusion:** To the physicist, the distinction between Infra-red Rays and heat waves is as marked as between red and blue light of the visible spectrum.

The reason for the ease with which we distinguish between "red" and "blue" lies in the reaction of the sense of sight to those colors, while the Infra-red Rays are visible and make no sensory impression until converted into heat. Hence, we have associated them with the *heat* sensation.

Infra-red Rays, the same as Visible Light, are forms of Radiant Energy, and possess no thermal quality until transformed into heat by resistance.

"Radiant heat (*light*) waves are not heat waves."—Thompson.

"Neither Infra-red nor other radiation is heat."—Thompson.

Thompson, in his book, "Light, Visible and Invisible," remarks: "Infra-red Rays are not hot." (Page 201.)

2. **Scientific Designation:** The scientific designation of the Infra-red Rays may be determined as follows:

(1) Measurement of the wave length of the Rays by means of the refractometer and monochromometer;

(2) By means of selective screens, as shown in Test Figures 3 and 4;

(3) By means of tests with such scientific instruments as the Galvanometer and Thermopile, shown in Figures 6, 8 and 9.

3. **Experiments and Conclusions:** Figure 3. Glass or Ebonite shows no rise in temperature. Thermometer "A" shows no rise. Radiometer is affected. Thermometer "B" shows rise in temperature. Conclu-

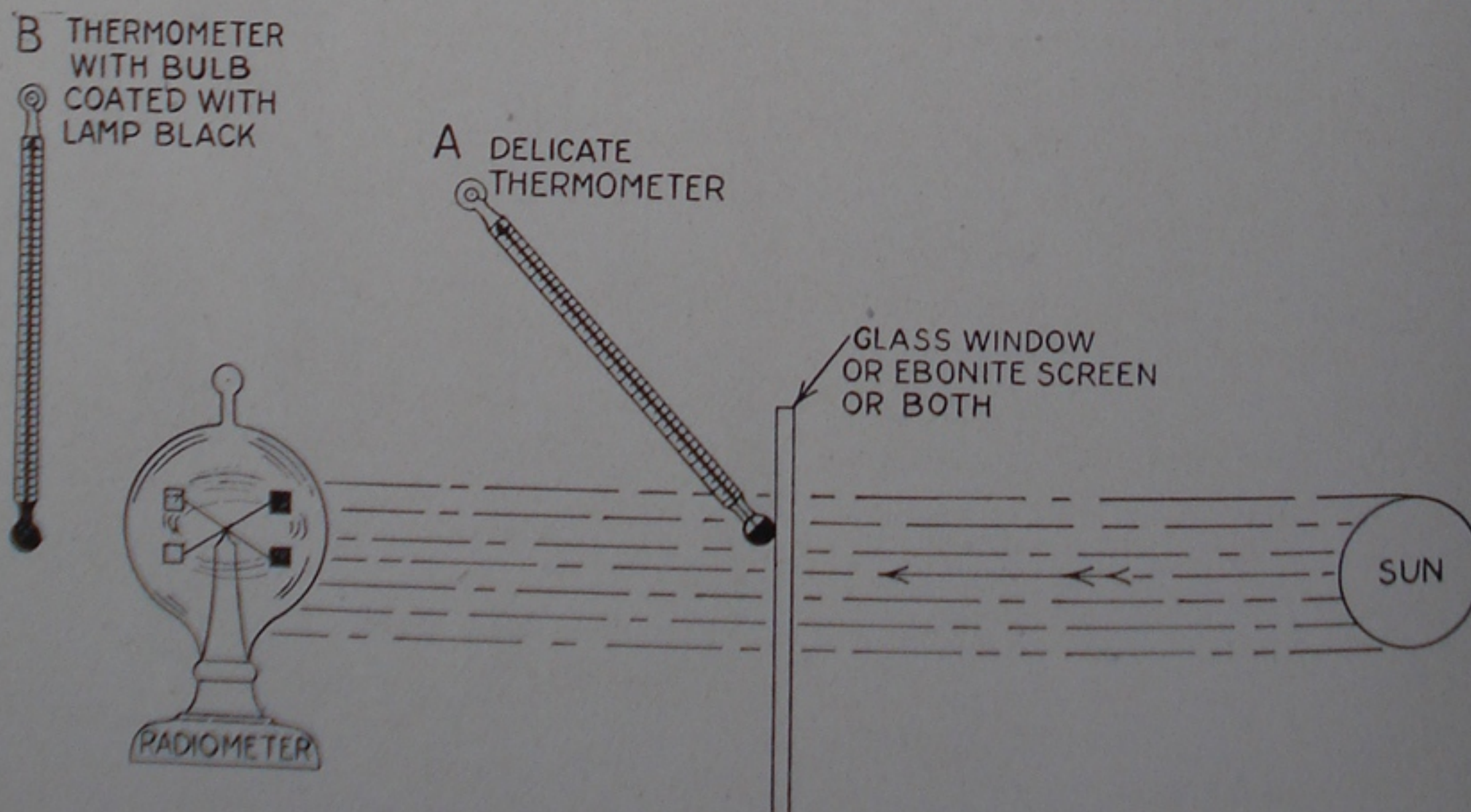


Figure 3.

Infra-red Penetration. Ebonite Screen Test

The invisible Infra-red Rays penetrate the ebonite screen, opaque to visible light rays, and register on the radiometer without heat production in ebonite screen.

sion: Radiant heat is Invisible Light and passes through certain substances without heating, and its energy can be shown beyond by various means.

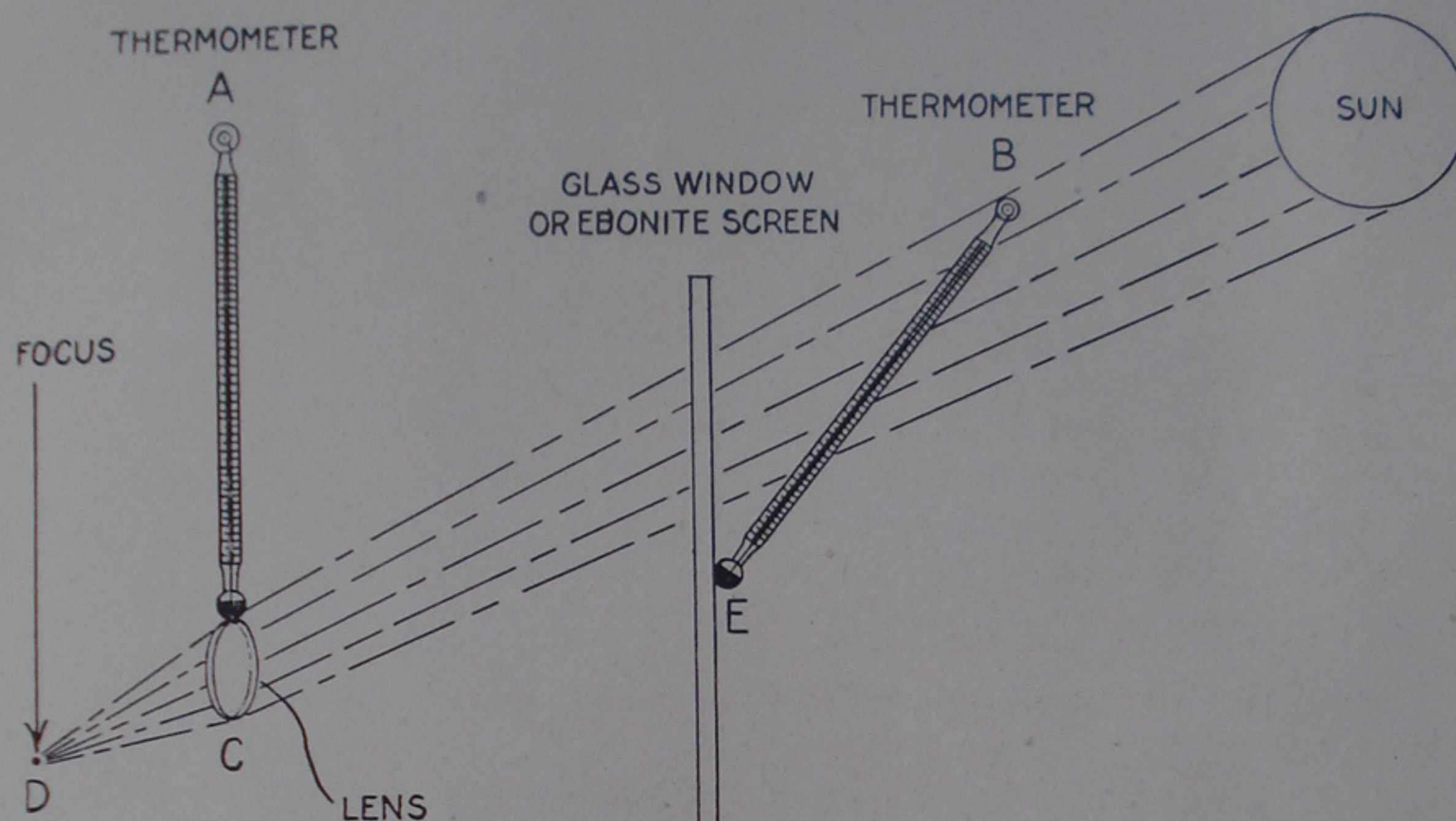


Figure 4.

Infra-red Rays Not Heat Waves

Heat waves are not refrangible. Infra-red Rays are refracted by lens C without thermal effects upon thermometers A and B—hence Infra-red Rays are Light Rays.

Figure 4. This diagram shows rays passing through glass or ebonite screen without raising temperature. Through lens "C" without rise in temperature. Hence refracted to the focal point where a match can be lighted, a cloth set on fire, or the hand burned. These were not heat waves or glass screen "E" would have absorbed all the heat with no transmission to lens "C". The air currents between would have carried all the heat away.

Radiant Energy (*Light*) can be reflected, refracted, diffracted and polarized.

A simple experiment is sufficient to give a clear understanding of the subject.

Take a seat in a cold room, with the windows closed, facing the rays of the Sun as they pour through the window glass. That portion of the body facing the Sunlight will at once experience a marked feeling of warmth, while other parts of the body, even those parts heavily clothed, will have no particular sensation of warmth. Upon moving out of the direct rays of the sun, a distinct "coldness" will be felt over the entire body.

Upon touching the window glass or placing in contact with it a delicate thermometer, it will be found that the temperature of the glass itself has not been raised appreciably by its exposure to the sun.

This simple experiment proves beyond doubt that there is some form of energy which will pass through window glass and affect the human senses directly, without affecting the physical condition of the medium through which it passes.

If a delicate thermometer is held in the rays of the Sun, shining through the windows, it will show but a slight rise in temperature; but if the bulb of the thermometer is smeared with lamp black or graphite, the rise in temperature will be quite marked. This shows that Radiant Energy, which will pass through glass without heating it, will be converted into heat rays by impinging upon or passing through certain substances.

Radiometer Experiment (See Figure No. 3): This device consists of a highly poised mill, at the end of each vane of which is a thin, square section of aluminum—all delicately balanced, and the entire device enclosed in a glass bulb from which air has been withdrawn to a very rare vacuum. One side of each metal segment is blackened with lamp black while the other side bears a high polish. On bringing this instrument into the Sunlight streaming through the window, as described in the previous experiment, the little mill will rotate toward the polished side of each segment and away from the blackened side.

If this device is brought into the spectrum of the Sunlight, and placed in the Ultra-violet end of the spectrum, there will be no motion of the vanes, and on moving it slowly toward the red end of the visible spectrum, no motion of the vanes will be noticed until practically the red end of the spectrum is reached. As progress continues through the red end of the spectrum, a faster motion is imparted to the vanes, and as the Radiometer passes on beyond the range of the visible spectrum, a still faster motion is given, for a considerable distance beyond the visible spectrum. It was by such experiments as this that the Infra-red spectrum was mapped by early investigators, until devices of extreme precision, such as the bolometer, were discovered. Thompson aptly observes: "The so-called heat waves, or Infra-red Rays, are not themselves hot. They do not heat the medium through which they pass as rays."

We have all used ordinary heat applied to the surface of the body by conductive methods, such as hot water bags, electric heating pads, etc.,

Treating a Case of Tubercular Hip

The Infra-red Rays are especially valuable in articular inflammations and infections, maintaining active catabolism and anabolism, with regression of oedema, for hours—or even days—continuously without reaction.



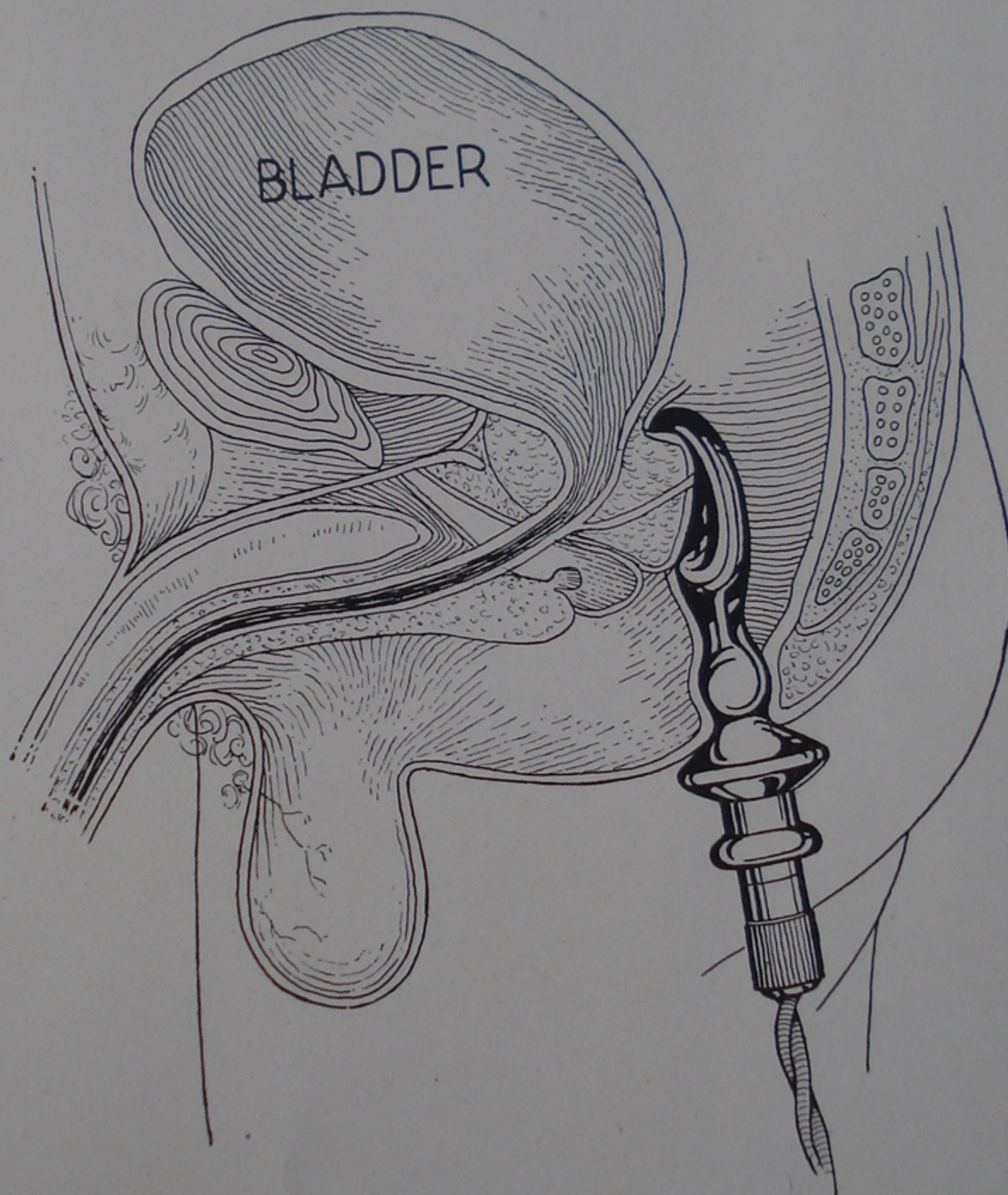
and have obtained beneficial results in conditions which were close to the surface of the body. Such heat, however, is of no value for deeper conditions, because it is carried away by the vascular system nearly as fast as it can be applied—or it is radiated by the body into the atmosphere.

Dr. C. M. Been, Columbus, Ohio, observes: "Heat has been used by all medical men, and even by the laity, for centuries, to relieve pain and disease; but the heat has been applied to the skin in the form of hot poultices, plates, stone lids, flat irons, hot water bottles, and more recently by electric pads. All these are good, but they only apply heat to the skin, and very little reaches the internal parts."

**Burdick
Infra-Red
Prostatic
Applicator**

Carrying the Infra-red Rays direct to the prostate gland, for the production of healing inflammation, with temperatures under accurate control for bactericidal action.

The vitalizing Infra-red Rays induce active cell proliferation and tissue regeneration in hypertrophied glandular conditions. Delete Burdick Prostatic instruments are especially well designed for applying the Infra-red Rays to the prostate and adnexa.



V

Proof That the New Methods Produce the Genuine Long-wave Infra-red Rays.

1. **Graphic Description of the Spectrum:** The Burdick Research Laboratories have spent many thousands of dollars in the scientific study

of the Infra-red Rays. Laboratory experts, working with the latest technical instruments, have tested every known source of Infra-red radiation, proving each step of the tests, to determine the source of greatest production and best adaption to therapeutic use.

The results of this arduous labor are set forth in the following principles, and illustrated in the various diagrammatic cuts in this section.

Figure B (page 10) shows the spectrum of radiation plotted graphically with the spectral bands as abscissae. The total range of wave length and frequency is enormous, covering nearly sixty octaves; but only a very narrow range of radiation, less than one octave, is visible. The invisible radiation with a wave length shorter than that of visible radiation, is known as Ultra-violet radiation and these rays, when absorbed, are capable of producing a chemical action, but produce very little heat. The invisible radiations of wave lengths longer than those of the visible range are known as Infra-red radiation, and these rays, when absorbed, produce heat. The Infra-red Rays have wave lengths covering a range of frequency of 8.68 octaves.

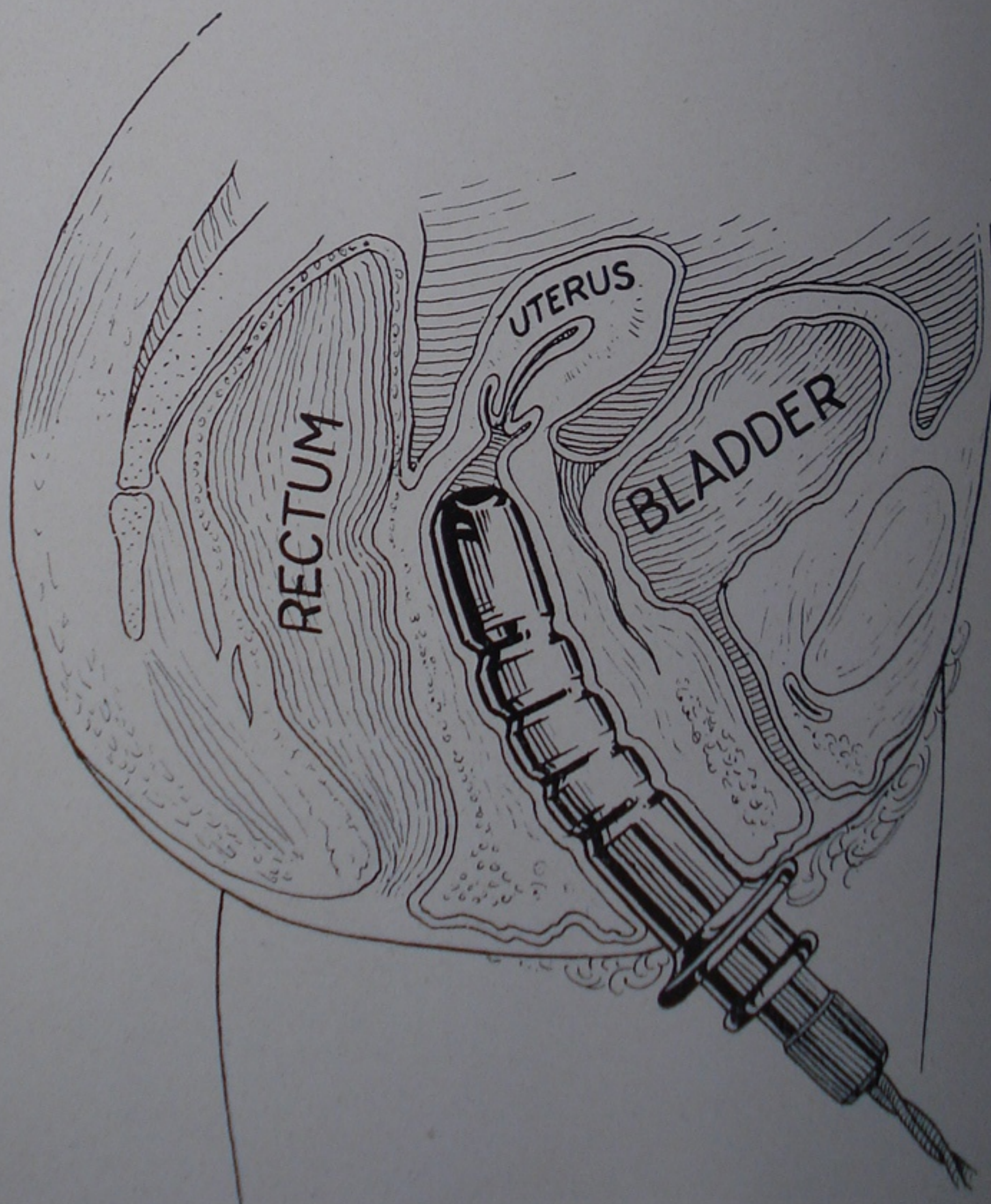
The value of Infra-red radiation in therapeutic use is due to the ability of the long-wave-length rays to penetrate the skin and tissue, giving up their heat in the deeper tissues as they are finally absorbed.

Vaginal Applicator— Anatomical Demonstration

In no class of cases are the Burdick Infra-red Instruments more beneficially employed than in treating pelvic inflammations and infections.

A special feature of the vaginal applicators is the corrugations which engage the rugae of the vaginal walls, giving added radiation and retention.

The accurate control provides a range of technique from tonic to sedative, and from bactericidal to reconstructive, action.



2. A "Black Body." A perfect "*black body*" is the most efficient source of the Infra-red Rays.

DEFINITIONS.

"A 'black body' is a perfect absorber or emitter of energy."

—Thompson—"Light, Visible and Invisible."

"A 'black body' is one which reflects none of the radiation impinging upon it, but absorbs all."

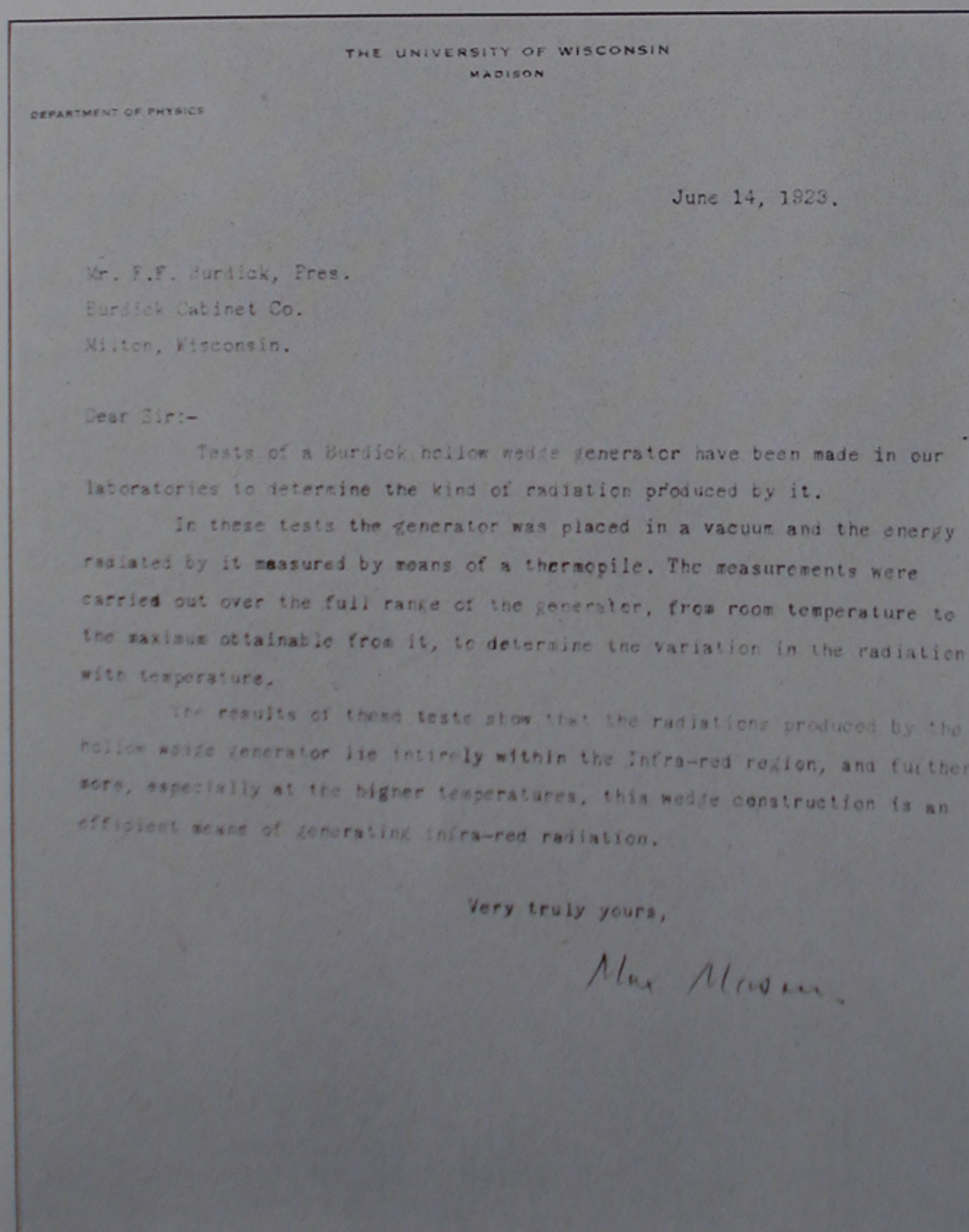
—Steinmetz—"Radiation, Light and Illumination."

"A 'black body' absorbs energy as heat and emits it as light."

—Thompson—"Light, Visible and Invisible."

The question next arises: What is the most perfect "black body," and hence the best emitter of Infra-red Rays?

(a) **History and Development of Infra-red:** The Infra-red spectrum was discovered by Herschel about 1804. He found, by blackening the bulb of a fairly active thermometer and passing it through the visible spectrum, beginning at the violet, that about the time the bulb reached the yellow band of the spectrum, a slight change in temperature was manifested. Continued rise in temperature was noted, as it passed along, to a considerable distance beyond the extreme end of the visible spectrum.



Of so little value was his discovery esteemed that only within the last few years have prominent physicists considered it worthy of attention. It seems strange that, with all our vaunted knowledge of science, we should have been so self-satisfied as to study and work with only about one-tenth of this great and wonderful subject—Light. For it is a force that may carry salvation from many of the scourges now afflicting the human race.

Consideration of Herschel's "black body" experiment, outlined above, and the fact that the thermometer bulb without the coating of lamp-black showed no rise in temperature, simply demonstrates further that there is some form of energy which will pass through various substances without being changed; yet, when this same energy impinges on a rough black substance, the radiant energy is changed to heat rays—shown by the rise in temperature of the thermometer. Similarly, these Infra-red Rays, impinging upon the human skin, are not reflected or disseminated, but are passed unchanged into the deeper underlying tissues and are there converted into heat, producing the active hyperemia required by Nature for proper repair.

Various scientists, namely, Aschkinass, Rubens, Nichols and Langley, have added very largely to our present knowledge of the longer wave-lengths of the Infra-red spectrum. They have found that various hydrocarbons, such as paraffin and benzene—as well as carbon disulfid—are transparent to the entire Infra-red spectrum, thus furnishing the scientist with the means of separating the many different wave-lengths of the several sections of the spectrum.

It has been found by actual experiment that any colorless body, heated to a temperature above that of room temperature, has the power of throwing off these invisible Infra-red radiations, and that particularly rich in these radiations were the emanations from a black body. *A body which is a perfect radiator and also a perfect absorber of radiant energy is termed a "black body," and when a "black body" is heated it gives off the*

Infra-red Rays in Varicosities

In varicose veins the Infra-red Rays normalize vascularity.

In varicose ulcers the Infra-red Rays stimulate healthy granulations from the bed of the ulcer, strongly resisting any walling-in of detritus.

The Compresses are convenient to apply in treating this class of cases, and the results obtained are frequently phenomenal.



largest amount of radiant energy possible for a given temperature. The amount of energy increases when the temperature of the "black body" is increased, but the energy is radiated at a shorter wave length; that is, by increasing the temperature of a "black body" sufficiently, the wave length of the radiation decreases so that it becomes visible and the body becomes "red-hot". By increasing the temperature still more the material becomes "white-hot," providing, of course, that the material will stand these temperatures without vaporizing or burning up.

There are three important laws of physics which deal with the phenomena of radiation from a "black body." These laws (see note, page 23) are too technical to be discussed fully, but they show that in order to get the long wave length radiation desired for therapeutic purposes, it is necessary to heat a black body to a temperature between 100 and 250 degrees Fahrenheit. This causes the predominance of the radiation to be emitted at a wave length within a few microns of 8μ . (See note 2, page 23).

As explained in a previous chapter, the original Infra-red radiation was discovered in Sunlight. But it has been found that some of the longer and more valuable of the Infra-red Rays—those with wave lengths around 8μ —will not penetrate glass, as glass will not transmit radiation whose wave length exceeds about 3μ . Quartz, which is quite transparent to Ultra-violet radiation is opaque to Infra-red radiation with a wave length exceeding 7μ . Rock salt is the only known material that is transparent to the longer Infra-red Rays. It is obvious, therefore, that *any device for the generation of Infra-red Rays must not be surrounded by glass or quartz*—no glass may intervene between the radiator and area to be rayed. Since it is the long rays of low intensity that are needed, it is necessary to use as perfect a radiator as possible to get the maximum amount of energy emitted as Infra-red energy and as little as possible transmitted by direct conduction or convection. A "black body," heated to low temperatures, is the ideal, and the temperature necessary to get the desired wave length can be calculated by Wein's displacement laws. (See note, page 23).

Relieving Breast Abscess

(Infra-red Generator
P-51).

All general practitioners, and particularly obstetricians and gynecologists, should be equipped with these valuable little instruments or prescribe them for use in their maternity cases.

The results are so dependable and so gratifying that no other means of relief is at all comparable with the Infra-red radiations from this appliance.



As a black body, Steinmetz used Silicon (Si), in rods heated to a moderate temperature by means of the resistance to an electric circuit inherent in the Silicon itself. Naturally, the wave lengths of the radiations given off depended on the temperature of the generating element.

Carbon rods of various diameters and lengths have been used as the nearest approach to a black body, but if they are continuously kept at a temperature sufficient to produce the highest type of Infra-red radiation, they disintegrate. Furthermore, the heating of carbon rods to a sufficient temperature consumes so much electrical current as to render their use prohibitive. There is the difficulty, also, of getting a mass of carbon uniformly heated and thus producing a quantity of radiation of definite therapeutic value and capable of quick and positive control. On heating carbon rods the linear coefficient of expansion is such that, unless a careful hook-up is made, the rods will break and form arcs, with danger of severe burns to both operator and patient. Carborundum (SiC_2), is rather more permanent than carbon, but is not nearly so efficient as Carbon or Silicon.

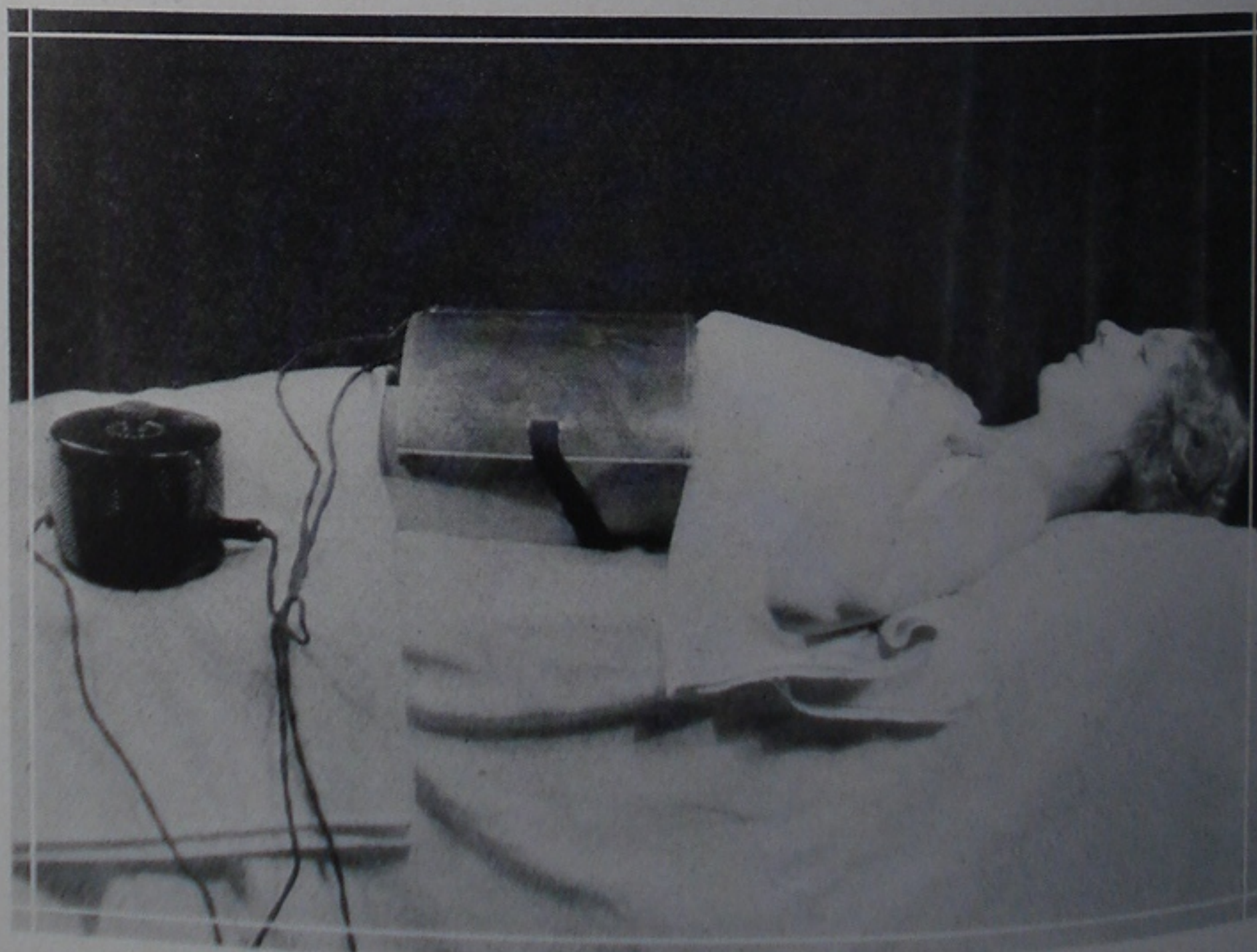
Now, if the most efficient producer of Infra-red radiation is a black body, the question arises: How may we produce a perfect black body?

A hollow wedge opening at an angle of 5 to $7\frac{1}{2}$ degrees, with polished inner surfaces, and electrically heated, is the most perfect "black body," and hence best generator of Infra-red Rays. It is a well-known physical fact that when a sheet of polished metal is folded into the form of a hollow wedge of 5 to $7\frac{1}{2}$ degrees' opening, the ends closed to exclude extraneous light, and the wedge then held in a bright light, a condition of complete reflection supervenes and we have thus a "black body," one in which we have almost perfect absorption and emission of radiant energy.

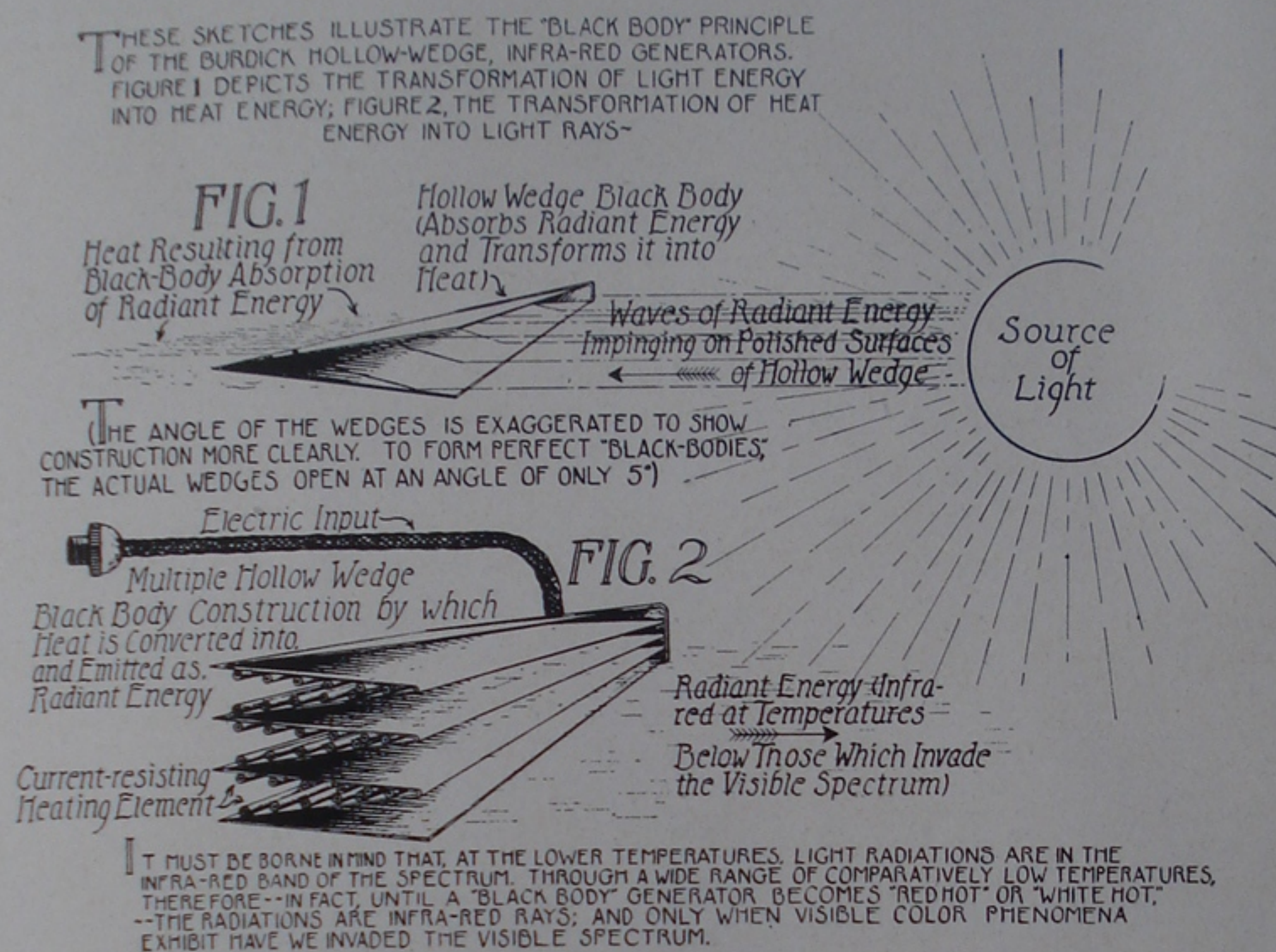
Gastric Ulcer Technique Illustrated

Infra-red applications for gastric ulcer, are made for both "Short Intensive" and "Mild Prolonged" effects. "Short Intensive" applications are first made for derivative action, followed by "Mild Prolonged" for promotion of healing processes and the reduction of hyperchlorhydria.

While Visible Light and the Ultra-violet Rays have proved of great value in this class of cases, practical tests indicate even better results from the proper use of the Infra-red Rays.



The illustration below (Figure 1) represents the principle of the hollow wedge as applied to black body production of Infra-red Rays; and, taking the principle evolved by Rubens and proved by Steinmetz, et. al., that a perfect absorber of energy is a perfect emitter, this constitutes a "black body."



And according to theory and practice, a "black body" heated moderately gives off Infra-red Rays. So, if we prove the wedge (Figure 1) a perfect absorber, it must be a perfect "black body" and, when heated, the best producer of Infra-red Rays.

Note 1.

$$\text{PLANCK'S LAW: } J_{\lambda} = C_1 \lambda^{-5} \left(e^{\frac{C_2}{\lambda T}} - 1 \right)^{-1}$$

$$\text{WIEN'S LAW: } \lambda_m T = 2940$$

$$\text{STEFAN BOLTZMAN LAW: } J_{\text{total}} = K(T^4 - t^4)$$

Note 2: The Greek letter μ is the symbol for the unit called the micron which is a unit of length of one-thousandth of a millimeter. One micron equals 10000 Angstrom units, abbreviated A.U.

Safe and Effective Rectal Dilatation

Rectal dilatation with Infra-red relieves sympathetic tension and enhances portal circulation and elimination.

The accurate Potentiometer Control insures definite applications for definite results. There are dilators of various sizes, for all ages and conditions of individual patients.



The hollow wedge is made of highly polished metal, its sides subtending an angle of not to exceed $7\frac{1}{2}$ degrees. "Source of Light" may be any source of Radiant Energy, natural or artificial, sending countless rays of energy into the hollow wedge.

We take any one of these rays which enters the wedge; and, in accordance with the law of reflection, "the angle of incidence is equal to the angle of reflection," the ray is reflected back and forth across the hollow wedge, getting shorter and shorter at each reflection, until it finally extinguishes itself. Each separate ray acts likewise, and we observe that the highly polished wedge, even when held in the strongest Sunlight, seems absolutely black.

This, according to Rubens, Achkinass, Herschell, Thompson and Steinmetz, constitutes a perfect "black body," which, as stated before, gives off, when moderately heated, Infra-red Rays of wave length and penetrability commensurate with the amount of heat applied.

3. Multiplication of "Black Bodies": When a single black body is used, the energy is limited, because the energy at low temperature and long wave length is very small. To get enough energy to be effective it is necessary to increase the number of individual black bodies, each at the same temperature, and each one giving off its energy at the same wave length. The total energy emitted from the individual black bodies becomes large, but the wave length is still long; for, if an attempt were made to increase the energy by increasing the temperature, the wave length of maximum energy would not remain long but would become appreciably shorter. In order to get the desired intensity, a multiplicity of single black bodies is secured by making the wedge "continuous," that is, making parallel wedges by folding a flat piece of sheet metal so as

to get about eight wedges in a length of one inch. Every wedge is heated to the same temperature and gives off radiation at the same wave length.

By making, thus, a series of wedges from the same piece of metal, a "black body" appliance of any given length and width can be produced. When such a device is wired with current resisting wire and electric energy introduced, heat develops in the "black body," rendering it capable of producing enormous quantities of Infra-red radiation the wave length of which is controlled by the temperature at which it is operated. This temperature, of course, must be appreciably above the normal body temperature of 98.6 degrees.

A secondary advantage of the "continuous wedge" is that practically the whole exposed face of the applicator is a black body and Infra-red radiation is emitted over its entire surface. The surface can also be curved to direct the rays at the desired angle.

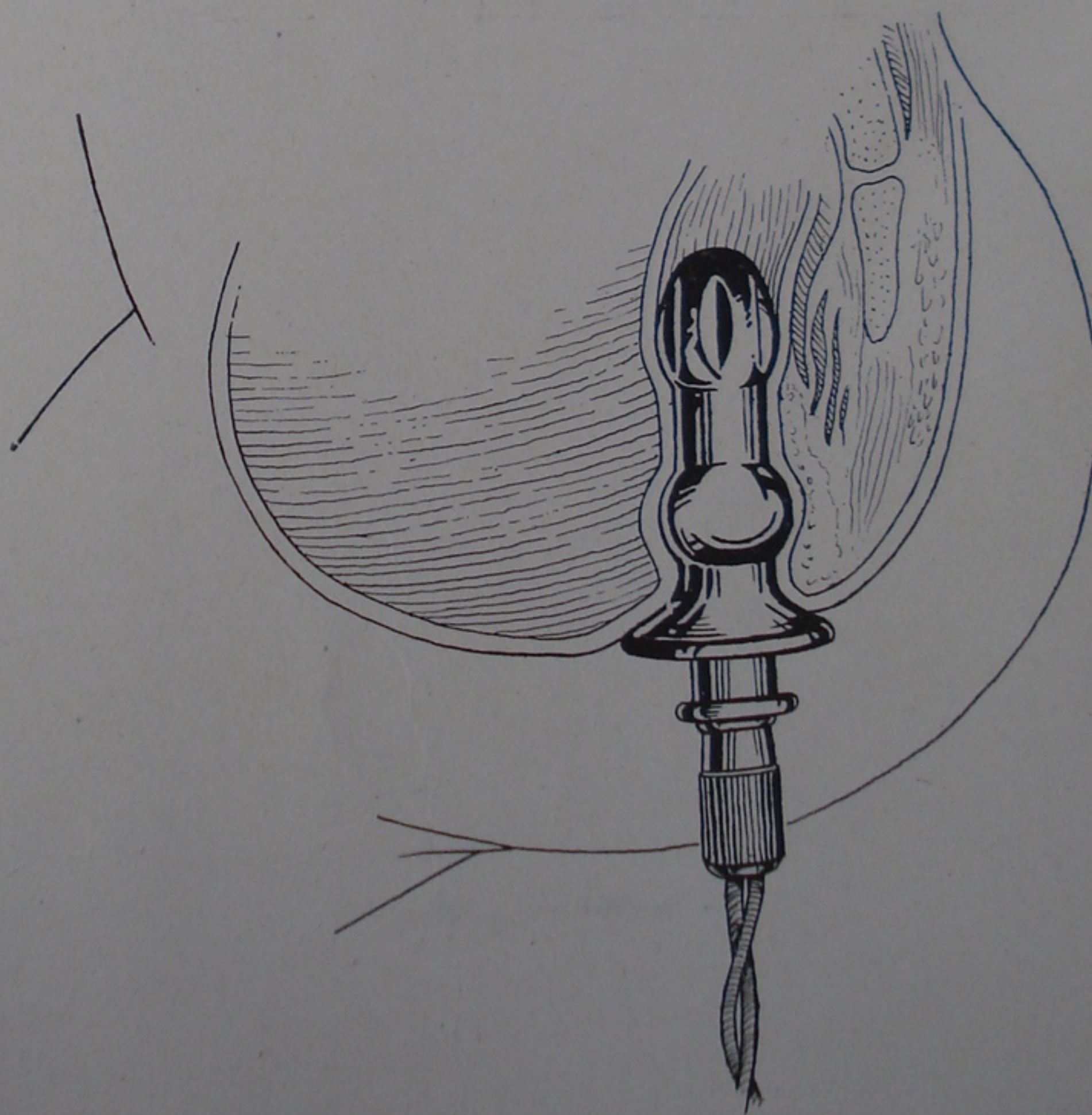
4. **Experiments and Conclusions:** Elaborate tests were made in the Research Laboratories of the Burdick Cabinet Company to prove that the Infra-red applicator, using the "continuous wedge," is a generator of Infra-red radiation. Similar tests confirming the findings of the Burdick Laboratories were made by the Department of Physics of the University of Wisconsin, whose report is shown elsewhere in this work. (Page 19.)

Rectal Infra-red Dilator

The medical profession is familiar with the benefits of rational rectal dilation in certain classes of cases.

The benefits of rectal dilation by means of the Burdick Infra-red Dilators so far surpass the results of ordinary dilatation that the Infra-red method becomes at once a new and accepted technique in rectal procedure.

(Note the patented conformation, for natural retention by the sphincter muscle.)



To detect and measure the Infra-red radiation it is necessary to use two very delicate and sensitive instruments. (Figure 6.) These are the thermopile and reflecting galvanometer. A detailed explanation of these instruments is beyond the scope of this article, and it is only necessary to know that the thermopile is an instrument which absorbs the Infra-red radiation and converts it into heat. This heat at the thermo-junction of

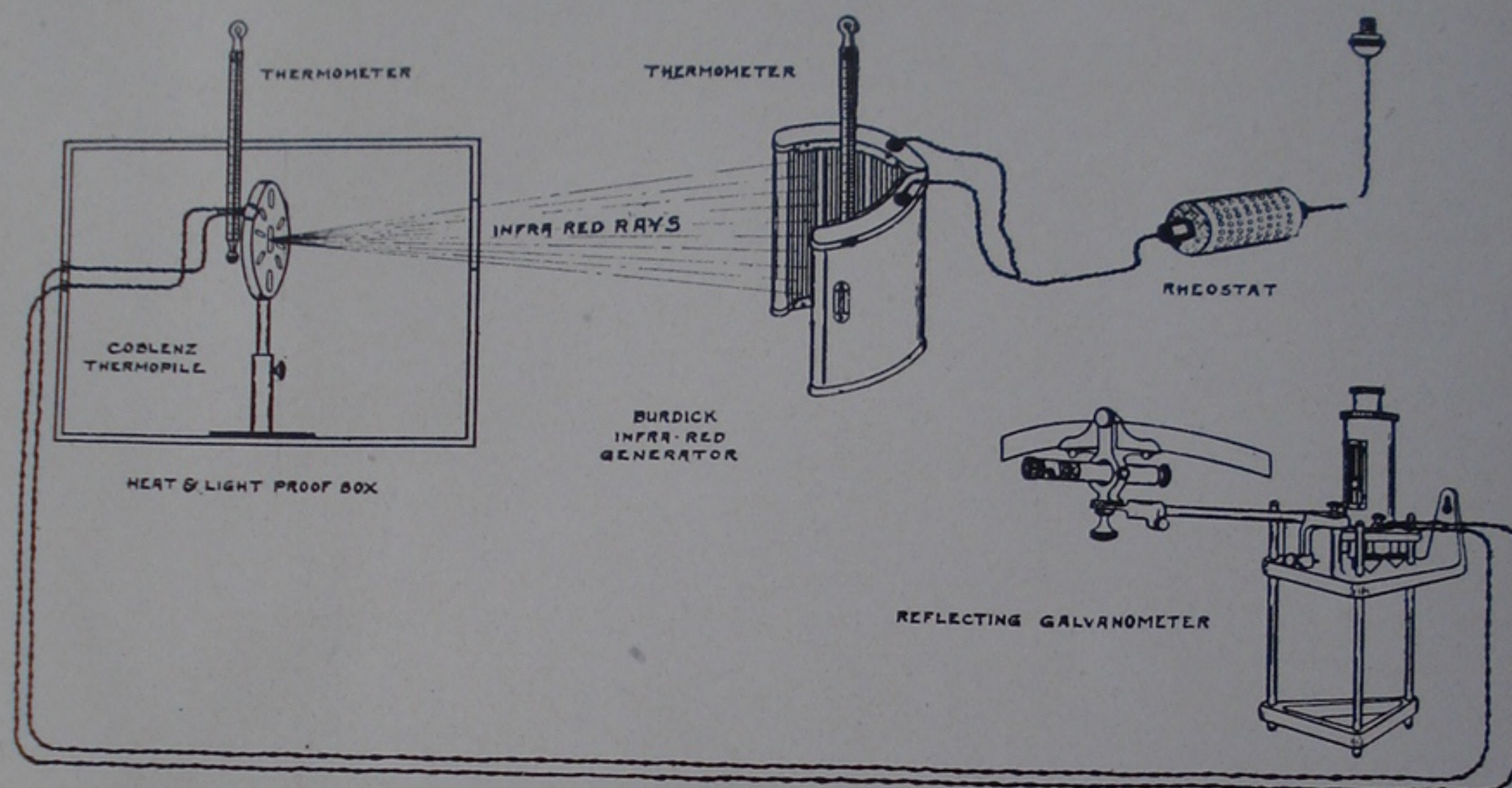


Figure 6.

two unlike metals in the thermopile generates an electric current. This current is very feeble and must be detected by a very sensitive instrument known as a reflecting galvanometer. In this instrument there is a very small mirror which is caused to turn in direct proportion to the current coming from the thermopile. The mirror reflects the image of the scale to the telescope through which the indications of the instrument are observed. The deflections of the galvanometer are in direct proportion to the amount of Infra-red energy falling upon the thermopile.

The thermopile is so sensitive to Infra-red radiation that it has to be enclosed in a heat and light proof box to exclude errors due to radiation from the observer's body, etc. This box has a small slot through which the Infra-red Rays from the generator pass and fall upon the thermopile. Above the thermopile, in the box, is a sensitive thermometer to indicate the temperature of the air within the box. The temperature of the Infra-red generator is indicated by a thermometer.

Experiment: The test consisted of varying the temperature of the Infra-red generator and taking the deflection of the galvanometer for the various temperatures. From these readings a curve was drawn which shows the total energy radiated for each temperature. This corresponds to the curve plotted from the Stefan-Boltzmann law: $J_{\text{total}} = K (T^4 - t^4)$. The value of the constant, K , was evaluated mathematically and the curve for the Stefan-Boltzmann law plotted. (See Figure 7)

The curve plotted from the data taken on the Burdick Infra-red generator was practically identical to the curve plotted from the Stefan-Boltzmann formula, which proves that the Burdick Infra-red generator generates Infra-red rays and obeys the laws of Physics relating to "black body" radiations.

Proof that the energy received by the thermopile was Infra-red radiation, and not convective or conductive heat, lies in the reading of the thermometer in the thermopile box. This thermometer was placed behind the thermopile so it would not absorb any of the infra-red radiation, but would simply indicate any rise in the temperature of the air surrounding the thermopile. The thermometer showed no rise in temperature.

Comparative Black Body Graph

Showing the energy radiated by Burdick Infra-red Compress as compared with the total energy radiated by black bodies according to the Stefan-Boltzmann law. It will be noted that the curves are practically coincident.

The curve shown in the lower graph represents that plotted from a theoretically perfect black body generating in an absolute vacuum, the measurements being made by instruments which (theoretically) were also operated in a perfect vacuum.

The curve shown in the upper graph naturally could not conform exactly to that shown in the lower graph for the reason that the instruments used in our computations could not be placed in a perfect vacuum nor was it possible to place them in an absolutely light proof apparatus on account of the necessity of making the necessary readings at frequent intervals. Nevertheless, the fact that the two curves are practically coincident proves that the Burdick hollow wedge is a perfect black body.

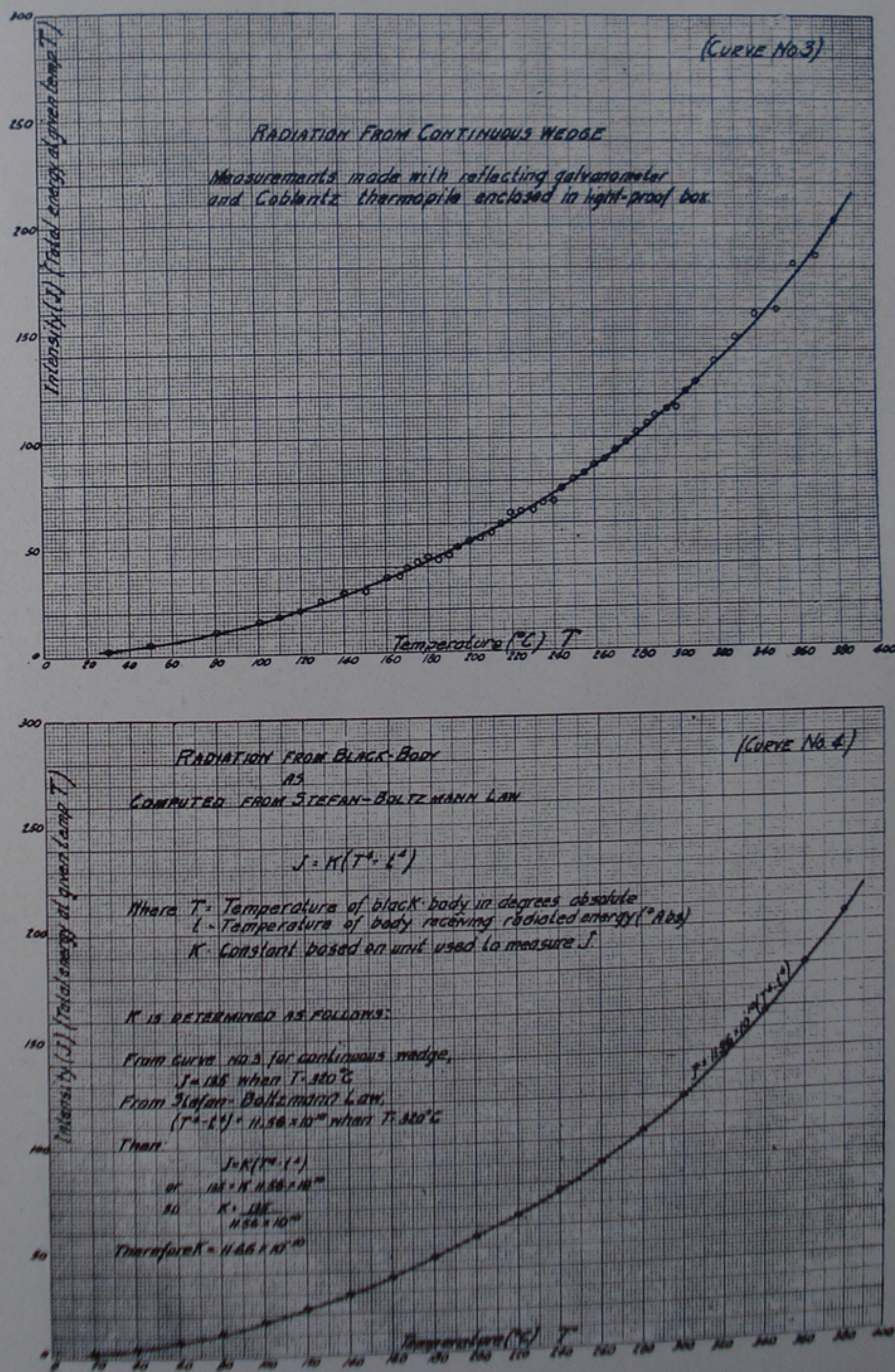


Figure 7.

Note: Refer to technical Bulletin No. 103 for curves and detailed account of this procedure.

Experiment: The hollow wedge "A" (Figure 8) of 5 degrees is moderately heated. Certain rays pass through the Halite or Selenite screen, "B", and impinge upon the thermopile, "C", producing heat which the thermopile converts into electric current which causes a deflection of the reflecting galvanometer, "D."

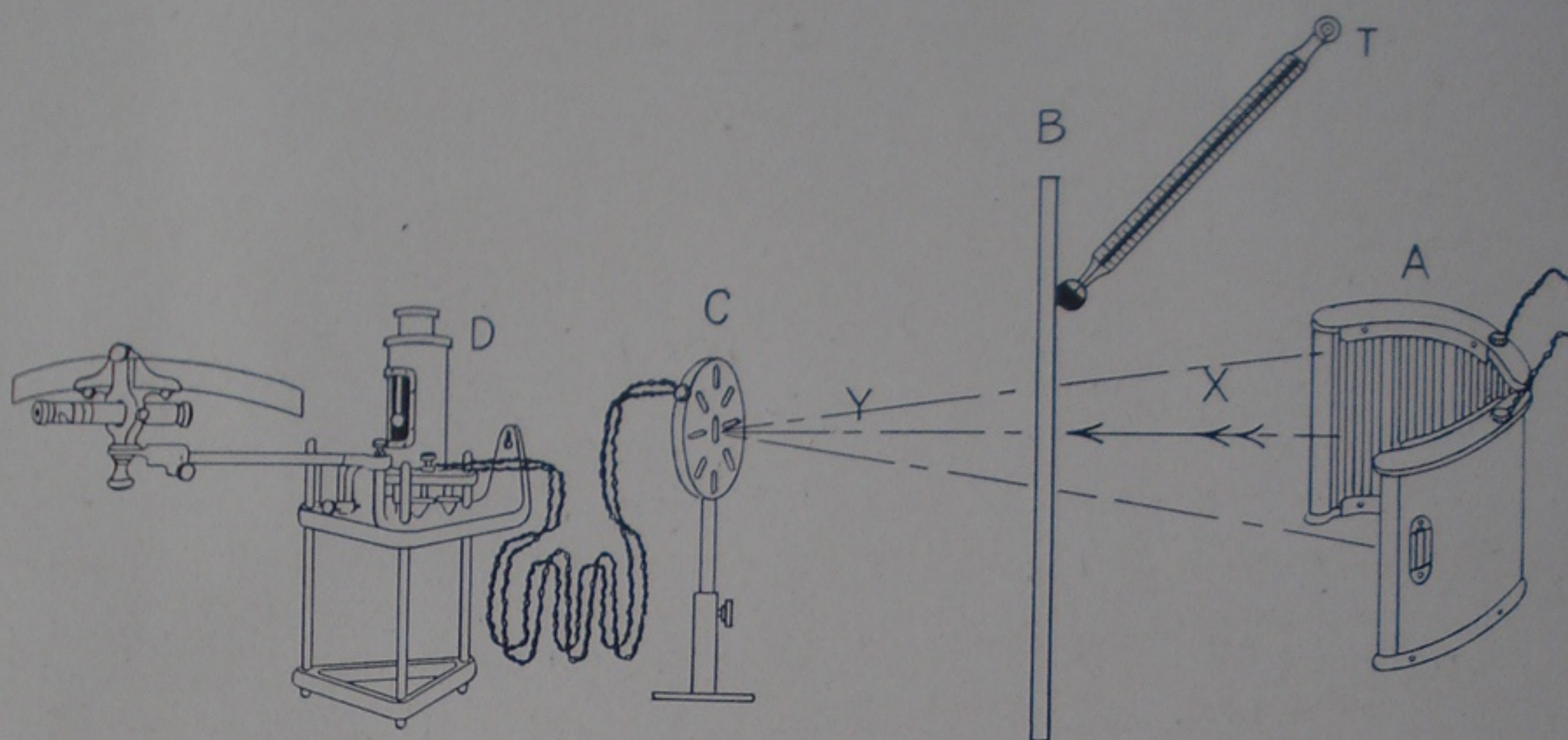


Figure 8.

The Bolometer Test

Infra-red Rays from the Burdick "hollow wedge" Compress pass through ebonite screen B without absorption, energizing Thermopile C and Galvanometer D.

There is no deflection of galvanometer, "D", until wedge, "A", is heated, and the best evidence that the heat waves do not exist is that in the presence of heat waves, the air spaces, "XY", would carry the heat away as fast as formed, and thermometer, "T", would show a rise in temperature of Screen, "B."

An electric fan is put in operation, its air-blast blowing perpendicular to the rays, "XY". Now if these were ordinary heat rays they would be blown away. But as the deflection of the galvanometric needle at "D" still shows deflection, it is evident that we are not delivering heat waves, but are producing Infra-red Rays.

Conclusion: As the experiment is performed in a dark room, it proves that the rays are invisible but yet are light. As more intense heating brings the wedge to red heat, we thus prove that the original rays were Infra-red and that the additional heating brought us into the visible spectrum. The rays penetrate the air and the screen "B" without heating them; hence we demonstrate the penetrating power of the rays, and also the fact that they are light rays.

Experiments (Figure 9):

- "A" = Burdick hollow wedge. (Perfect black body.)
- "B" = Parabolic reflector.
- "C" = Halite lens.
- "D" = Halite prism.
- "E" = Delicate thermopile.
- "F" = Delicate reflecting galvanometer.

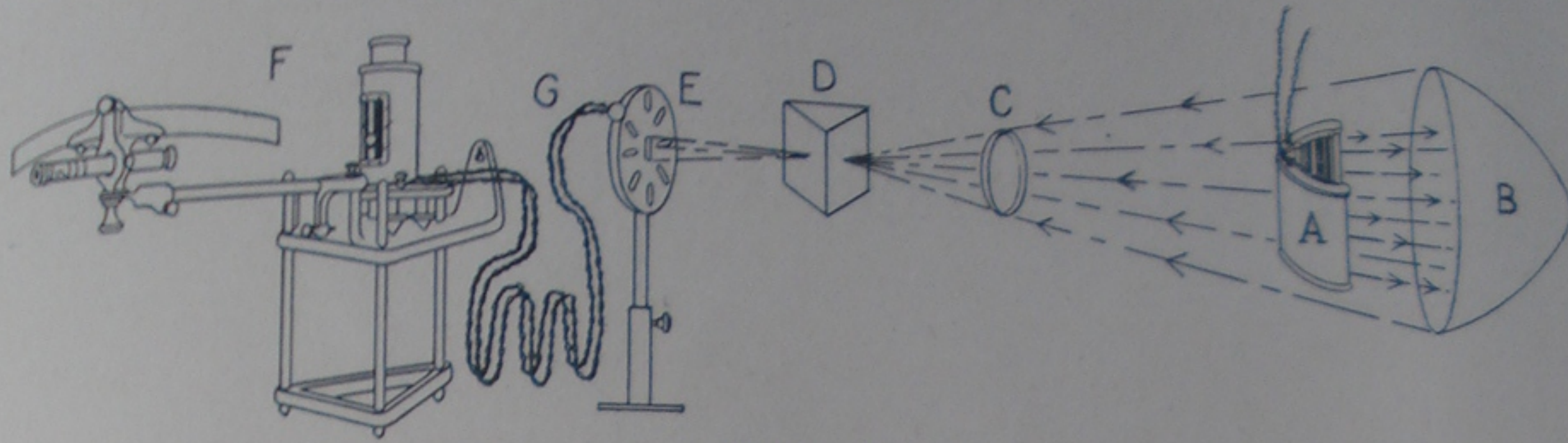


Figure 9.

Reflection—Concentration—Refraction Test

Reflection and double refraction without heating any of the elements involved proves the rays to be light rays. (See report below.)

Wedge, "A", with its face turned toward the opening of a parabolic reflector, "B". Wedge, "A", is heated and the rays formed are thrown into the parabolic reflector, "B", which reflects them and converges them to lens, "C", which refracts and concentrates them on prism, "D", which changes the course of the Infra-red Rays, refracting them to the slit of the thermopile, "E", where the rays are converted first into heat, and thence into electricity which is transmitted by wires, "G", to galvanometer, "F", which shows a large deflection. These rays are invisible, yet here we see them reflected and converted by the parabolic reflector, "B", refracted and condensed by lens, "C", to a point on prism, "D", and refracted out of their then plane to thermopile, "E". Here we have refraction and reflection, without any of the elements being heated. This proves that these rays are light rays.

Rational Vaginal Treatments

The Infra-red method offers perhaps the greatest recent advance in way of safe, effective relief of the various inflammatory, catarrhal and infectious conditions common to the female genitalia.

The large variety of instruments in the Burdick Infra-red Series makes possible a wide range of work in this field, with distinct advantages over other methods.



VI

The Technique for the Use of the Infra-red Rays is not Complicated, and It Permits Perfect Dosage Control for Delicate Applications.

1. Simplicity and Certainty: In probably no other modality in physical therapeutics is application more simple, control more absolute, and dosage measurement more exact than in the appliances for the use of Infra-red Rays, described in this manual.

Instruments with delicately calibrated control now make possible focalized internal applications for destruction of infections, fibroses, etc. These methods of definite control make possible the graduation of a course of treatments according to symptomatic indications, and the writing of accurate prescriptions to meet these specific cases.

Applications are divided into two general classes: (a) "Mild-Prolonged"; and (b) "Short-Intensive."

(a) "Mild-Prolonged" applications are especially adapted for use with the patient in bed—in the hospital or at home. The applications may be continued for hours, days, or even weeks. In making these "Prolonged" applications, the applicator, whatever the type, should be removed once each day and the skin bathed with cold water.

The class of cases where these "Mild-Prolonged" applications are especially indicated is large: (1) All painful conditions, such as arthritis, rheumatism, neuritis, sprains, dislocations, contusions, surgical wounds, and various traumatic lesions; (2) congestions of various types associated with low vitality, such as gastric—for either direct stimulation or indirect derivative action—pelvic, splanchnic, renal, articular and respiratory.

**Relieving
Pulmonary
Congestion**

No other means or device known to medical practice—in office, home or hospital—is at all comparable with these practical, safe, effective Infra-red Pads for local, surface applications.

They are light in weight, under thermostatic or potentiometer control, soft and comfortable to the patient, and most positive in their effects.



The effects produced by these "Mild-Prolonged" applications are:
Soothing—*Sedative*, combined with cellular stimulation;
mild, active, hyperemic—maintained, under control, indefinitely.

Appliances to be used:

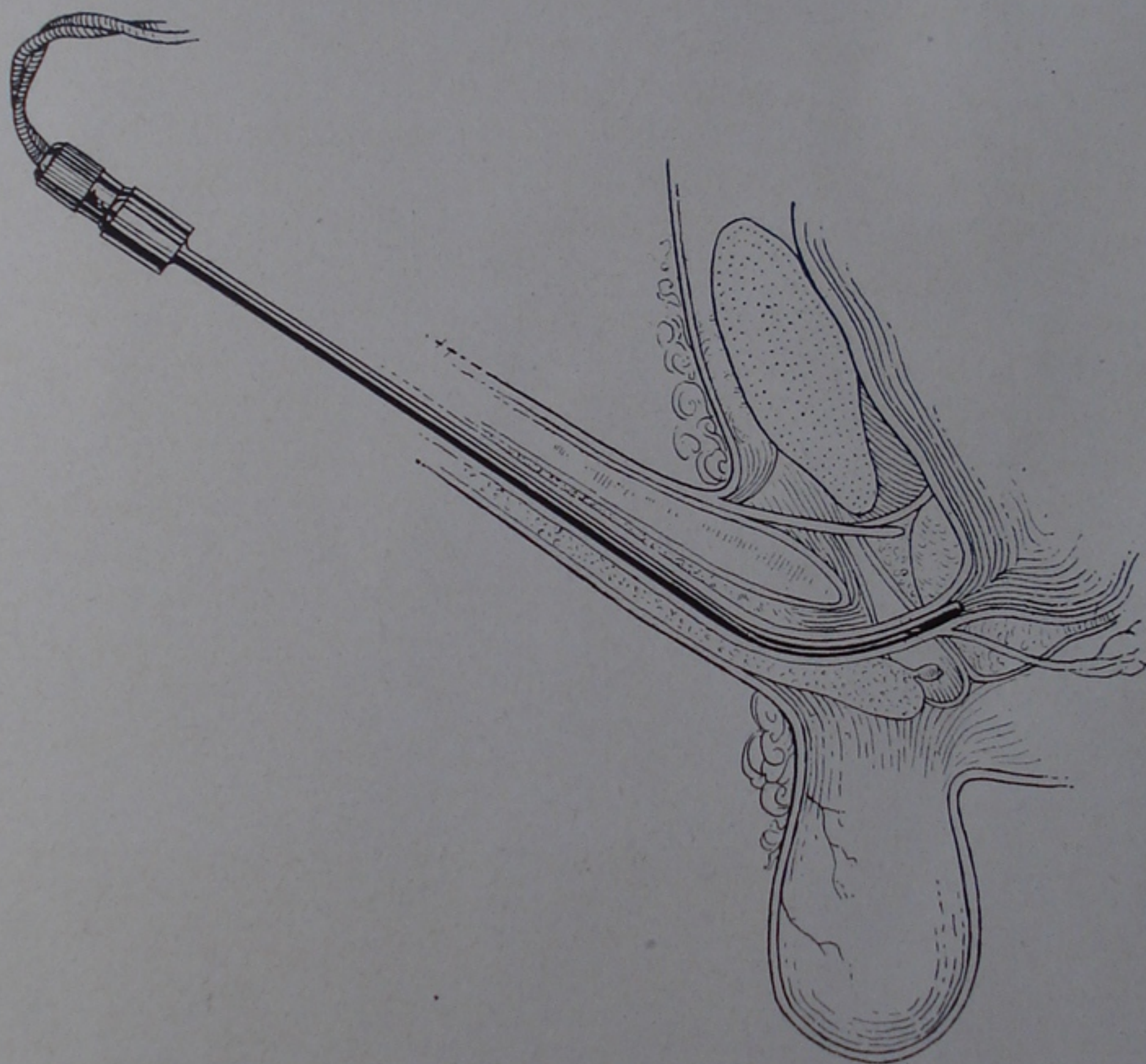
- A. Infra-red Compress type generators.
- B. Infra-red Pad type generators.
- C. Infra-red Orificial Applicators.

(b) The "Short-Intensive" method follows the general principles of the "Mild-Prolonged" applications, except that it is adapted to office work, as well as to use in the hospital and at home. Its use covers the entire list of Infra-red applications.

Infra-red Urethral Applicator

For anterior and posterior urethral application for bactericidal, tonic, and sedative effect.

"G. U." operators claim that the difficulties of urethral treatments are overcome by the Burdick Infra-red method; and that the results achieved are so unusual that the appearance of this series marks a new era in "G. U." practice.



2. Therapeutic Application: The use of the various Infra-red appliances as therapeutic modalities is not founded on the sands of an undemonstrable theory, but upon the solid rock of demonstrable fact. It has been shown:

1st. That Infra-red Rays do penetrate deeply into human tissue;

2nd. That Infra-red Rays are convertible into safe heat, and hence produce active hyperemia in these deep tissues;

3rd. That if Infra-red produces hyperemia, it will break up stasis and congestion quickly and effectually by bringing into the area an increased amount of fresh blood, highly charged with oxygen and hemoglobin;

4th. That practically all diseases are accompanied by, or caused by, a passive sanguiferous engorgement (stasis), and relief cannot be obtained until this passive engorgement is corrected. (Blood in a condition of stasis may well be likened to a sewer that has been stopped up at some point until the sewage is backed up into the cellars of the various houses with concomitant pathological outbreaks [stasis]. Workmen [red and white corpuscles] are sent for post haste. They bring their hoses [any device that will flush out these congested areas with blood] which, when attached to the nearest hydrant, wash out the effete material.) Thus does the freshly oxygenized blood, bringing oxygen and hemoglobin, serve in washing out the effete material resulting from a condition of stasis in any area. Venous blood is charged with waste formed by the breaking down of body protoplasm, which is being conveyed to the various emunctories for final passage from the system as excreta;

5th. That propositions 1, 2, 3, and 4, can be proved; and, that being true, one can reach a definite conclusion, i. e., that any one of the Burdick Infra-red appliances will break up stasis and congestion in a natural, safe and rational manner, and will give quick and complete relief from subjective pain in conditions that get scant relief with opiates and narcotics.

Infra-red Colonic Applicator

The Infra-red Colonic Applicator has many distinct advantages.

Applications are made to definite local areas such as ulcers, abscesses, and infected areas—or to the general colonic field in catarrhal and other conditions.

The Infra-red Rays have a marked reconstructive action on the colonic mucosa, while bactericidal action by definite thermal application may be obtained in certain cases of infection.

Genu-Pectoral Position



This is such a sensible, safe modality that, with a few directions, the physician may prescribe it for his patient. He can have every assurance that the patient will receive these mild and healing light radiations according to his directions as long as the electric current is on, even if the attendant forgets, or the patient sleeps. And there is no possible danger in its application—such as tissue coagulation, burns, shocks, etc.

The "Mild-Prolonged" application has a large field of usefulness in those cases, either chronic or acute, characterized by pain, oedema, stasis and its sequelae—such as breaking down of tissues, slow healing ulcers, varicosities, fibroses, gangrene, etc.

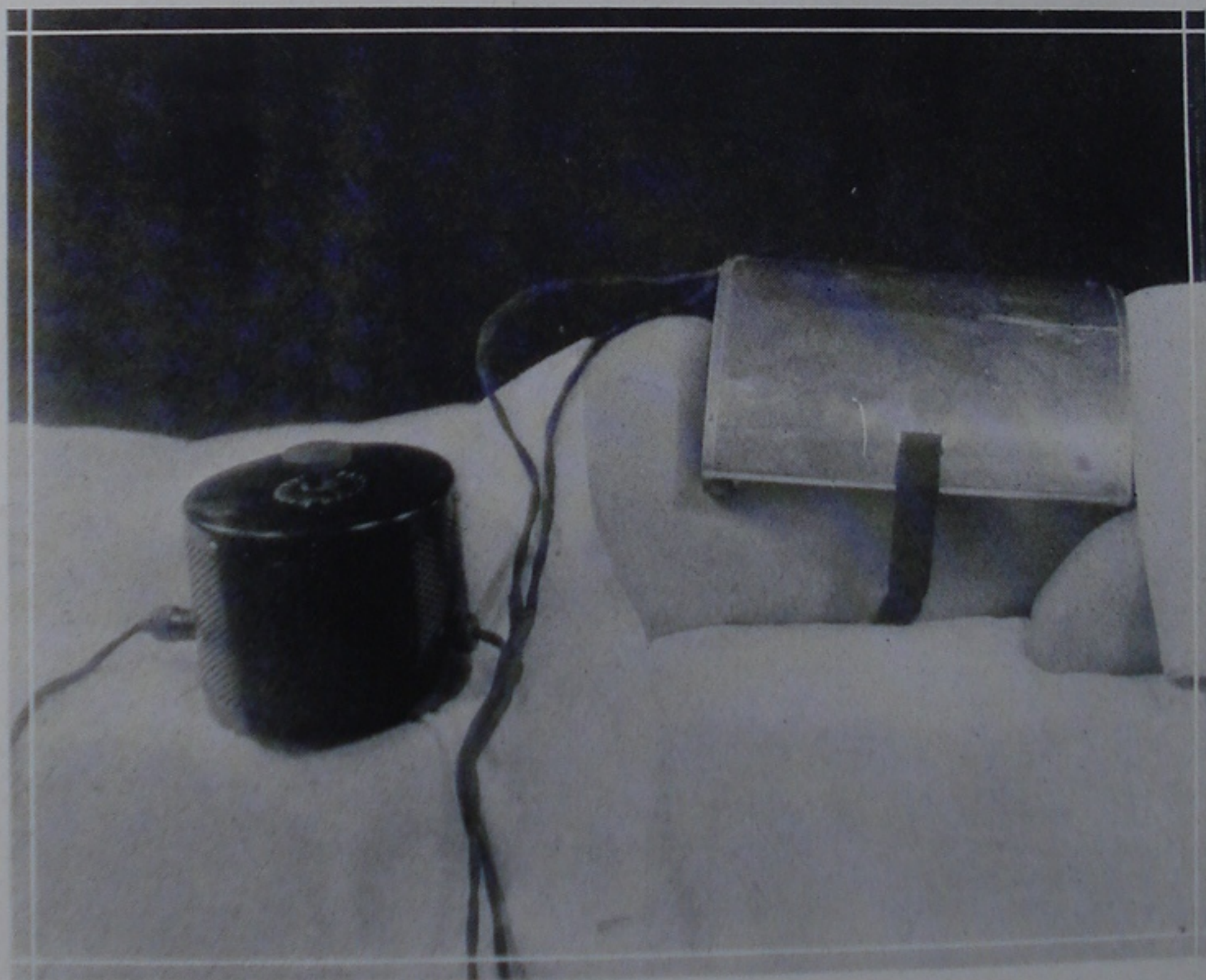
Infra-red Rays, as noted by Evans and Reisling, seem to have a specific effect in stimulating the inception of healthy granulations from the bottom of slow-healing abscesses. This treatment does not conflict with any other line of treatment outlined by the physician in charge. For instance, in the matter of slow-healing abscesses, the trauma should be thoroughly cleaned by antiseptics or perhaps sterilized by Ultra-violet light, and the Infra-red applicator then applied for hours at a time. These applications should be radiated to the bare epidermis and, if there is much hair, the parts should be shaved clean.

Renal Applications

The Infra-red Rays in Nephritis provide a definite technique for definite results:

"Short Intensive" to relieve inflammation of the kidney; "Mild Prolonged" for cellular regeneration.

Those not familiar with the splendid results in relief of pain and normalizing of pathologic conditions, obtained by use of Infra-red applications in this class of cases, will find the subject of vital interest.



Countless clinical reports demonstrate the wonderful possibilities in the treatment of various forms of rheumatism and rheumatic diathesis. These reports indicate complete relief from pain, absorption of exudates, with consequent regression of oedema. And this procedure does not conflict with the necessity entailed of studying each individual case to locate the focus of infection and to eradicate it.

Recent reports from Germany and France indicate an extensive use of Infra-red in malignancies, as relief from intolerable pain, without the locking up of secretions and tendency to habituation resulting from the use of opiates; some even go to the extent of claiming regression of the tumor mass. This last claim is of such import that it is receiving most careful investigation in the Burdick Research Laboratories, and not until careful tests have been satisfactorily completed will we make any statements concerning such broad claims.

It would seem, however, that, if we can raise the temperature of the tumor mass and surrounding tissue to a sufficient degree of heat to coagulate the malignant cells, without disturbing the normal cells, we shall have solved the problem, and our most ardent hope is the accomplishment of this gratifying result.

Although no set of hard and fast rules for the treatment of the various conditions with the Infra-red Rays can be given, a study of the physiologic effects of these rays as set forth in this section will guide the thoughtful practitioner in selecting that method of application best suited to the individual case.

Let him bear in mind the following salient points, as they will bring the attending physician to a comprehensive realization of the value of the entire line of applicators in any field of medical practice. Infra-red Rays:

- 1st. Are analgesic;
- 2nd. Are soothing and sedative;
- 3rd. Produce mild, prolonged hyperemia;
- 4th. Act as a cellular stimulant;
- 5th. Cannot possibly burn and shock patient, nor coagulate healthy tissue;
- 6th. Positively break up stasis and congestion.

Dorsal Application

Those familiar with the benefits of "fomentations" and "compresses" by means of flannel cloths dipped in hot water or steam, will appreciate the great superiority of the Infra-red method.

It is the most convenient and effective method of applying "Heat" to local areas—and to the deep tissue structures, by Infra-red penetration.



Finally, the technique exhibited in the use of Infra-red Rays does not interfere with other therapeutic or surgical procedure indicated for each individual. For instance, in the case of an abscess or furunculosis, it should be evacuated if ready and then treated with antiseptic agents, following which the Infra-red should be applied to the bare skin. If not prepared for evacuation and too late to abort the process, the Infra-red will in large measure prepare it for evacuation at the earliest possible moment. The same proposition holds good with adenitis, acne, and other diseases of bacterial etiology.

Neither does Infra-red therapy militate against the use of proper vaccines or sera, but rather enhances their antigenic and antitoxic properties.

3. Clinical Report: Clinical tests made in the Laboratories of the Burdick Cabinet Company on many college students suffering intense pain from various sprains, contusions, abrasions, and that peculiarly painful condition known as "charley horse," which has heretofore been treated by various liniments and embrocations, together with massage and bandaging, usually with loss of considerable time in bed—showed really remarkable results by one hour's treatment.

A. B. had an enormous "charley horse" on the right thigh. Was so excessively painful that he was carried into the clinic. He had been thoroughly massaged with liniment by his trainer, who had predicted at least a week in bed.

He was given one hour's treatment at moderate intensity with a Burdick Infra-red generator, and it was evident to several people present (two physicians among them) that the mass had been reduced 50 per cent in this hour, and that pain was almost entirely relieved. The patient walked away to his classes without the aid of a cane.

Relieving a Case of Otitis Media

(OA-1)

Every physician familiar with the benefits of "heat applications" in cases of ear ache, abscesses and all inflammations and infections of the middle ear will readily perceive the benefits of the direct application, in these conditions, of the more penetrating Infra-red rays.



VII

Will Heat Production of the Infra-red Rays in the Deep Tissues Take the Place of Diathermia?

1. **The Two Modalities Contrasted:** The nature and purpose of these modalities are quite different, though the Infra-red methods may be called upon to do much of the work of the diathermy currents, just as efficiently and possibly more safely and economically.

Heat production from the high frequency currents is from "within outward," while heat production from the Infra-red Rays is by penetration of the Rays from the surface to deeper tissue.

In other words, heat production by diathermy currents is "focalized" between two electrodes of equal or different sizes, while Infra-red energy is dispersed equally at all angles from the Generator over large or small areas.

2. **Advantages of Infra-red:** The use of Infra-red Rays overcomes many of the disadvantages encountered in the use of diathermy currents:

(1) **Expense,** both initial and operating: The low cost of the Infra-red appliances—with practically no maintenance or operating costs (as current consumption is small)—recommends their general use for internal heat-production purposes.

(2) **Safety:** Danger of tissue coagulation, present to a degree in diathermy, is entirely removed in Infra-red applications.

(3) **Portability:** Diathermy apparatus of sufficient size to be effective, is somewhat bulky, heavy, and difficult to move, while the Infra-red appliances are so light, and easy to carry from place to place, that their use need never be limited through lack of convenience.

(4) **Availability:** Diathermy transformers require an A.C. electric service and electrical adaptation, whereas the applicators comprising the entire Infra-red series may be connected to the ordinary light socket, either A.C. or D.C.

VIII

There Is No Danger Attending the Use of the Infra-red Rays as There Occasionally is in the Use of X-Rays and Other Electrical Modalities.

In physical therapy we have two classes of agents, destructive and constructive. The X-Rays, and to some extent the Ultra-violet Rays, belong to the former and the Infra-red Rays to the latter class. As shown by Steinmetz and others, the Infra-red Rays promote the growth of vegetation, while the Ultra-violet Rays are destructive to it.

The use of the Infra-red Rays is attended by no more danger than is present in the use of fresh air and sunshine.

For this very reason, the Burdick compresses, pads and applicators are especially adapted to use in home nursing and home treatments, under the direction of the family physician.

Steinmetz, Lukeisch, and other well known authorities on the Ultra-violet attest to the fact that the Ultra-violet rays, being actinic or chemical, have the power to destroy tissue, and that they are quite capable of killing vegetation. Steinmetz holds that our entire flora depend upon the Infra-red Rays of the sun, and that were they removed, all vegetation would perish, with the result that the life of our meat animals, and hence our own lives, would soon be wiped out.

Every physician who has used the Ultra-violet Rays recognizes the fact that, after a burn made by either the air-cooled or water-cooled Ultra-violet burner, there is considerable desquamation, and destruction of tissue.

Regarding the use of the X-rays, it cannot be doubted that they are destructive to both animal and vegetable life; the reason for the use of X-rays in cancerous conditions lies in their power of destroying cell proliferation.

Radium as a curative agent depends primarily upon the destructive power it has on human tissue; and, though it is an agent of highest value when carefully applied by one skilled in its manipulation, in the hands of the layman, it is an agent of most lethal properties.

Returning to the Infra-red Rays: Their use is attended by absolutely no danger whatever—no shocks, burns, or destruction of tissue can possibly follow the use of the Infra-red Rays, even when used by the novice; and the physician may safely hand one of the generators to the nurse—or even to a layman—and still be assured of excellent therapeutic results.

IX

The Process of Generating and Applying the Infra-red Rays Is Less Expensive Than Such Modalities as X-Ray, Ultra-violet, etc.

It needs but a cursory inspection of the apparatus for the application of Infra-red Rays to know that this is without doubt the simplest and least expensive of all physical modalities.

There are no elaborate electrical apparatus; no heavy cumbersome motors, dials, selectors; no exposed wiring and no need for special electric wiring or sockets.

The Burdick Infra-red Compresses and Applicators produce the necessary "black body" in the simplest form imaginable. The heaviest weighs only a few pounds and is so small that the physician carries it to the patient's bedside as easily as he carries his instrument case. He connects the Burdick apparatus to the ordinary electric light socket and regulates the intensity of the rays by the indicator on the regulator.

The current consumption is small, and the heat obtained uniform, so there is no necessity for attendance of the physician during the full period of the application.

The Burdick Applicators are produced by modern, quantity-production methods, in the largest plant for the exclusive production of Light Therapy apparatus, in the world. By these methods the unit cost is reduced to the lowest possible figure and the resultant selling price of the Burdick apparatus is so low that it is within the reach of the average patient for whom the physician prescribes it.

This means that the physician does not have to keep a large quantity of apparatus on hand. He need only have the Applicators and Compresses for his office treatments. When it is necessary for a patient to use the Infra-red for long, continuous periods at home, the physician may prescribe the particular appliance to be used.

Summary

To recapitulate: The Infra-red Rays do deeply penetrate human tissue and bone, to a depth of four to six inches, and are transformed therein into heat. A perusal of such standard medical authors as Gerstenberger, White, Cleves, Nagelschmidt, Schmidt, and a host of others convinces one of this fact and even demonstrates it by experiment.

Heat is molecular motion and it massages the deeper tissues. Heat eases pain—it is analgesic. Heat brings an influx of freshly oxygenized blood replete with the normal antigenic properties of the blood and increased hemoglobin content.

Not only our own laboratories but many others have reported that the Burdick Infra-red generator produces a rich radiation of Infra-red invisible light rays.

Add the above statements together and one cannot fail to agree with us that the Burdick Infra-red generator series are worthy of a thorough trial. They are founded on a strict scientific basis, are safe, sure and portable. They can be entrusted to your nurse or office girl with the assurance that they will function properly. Should the attending physician deem it advisable, the compresses and pads may even be operated by an intelligent patient—under the physician's direction, of course.

From the very first the reported experiences of the physicians in whose hands we have placed these appliances confirm our belief that in them there has been given to the medical profession a therapeutic agent of the highest order and one of the few modalities in the use of which there are no contra-indications.

Burdick Infra-red Compresses

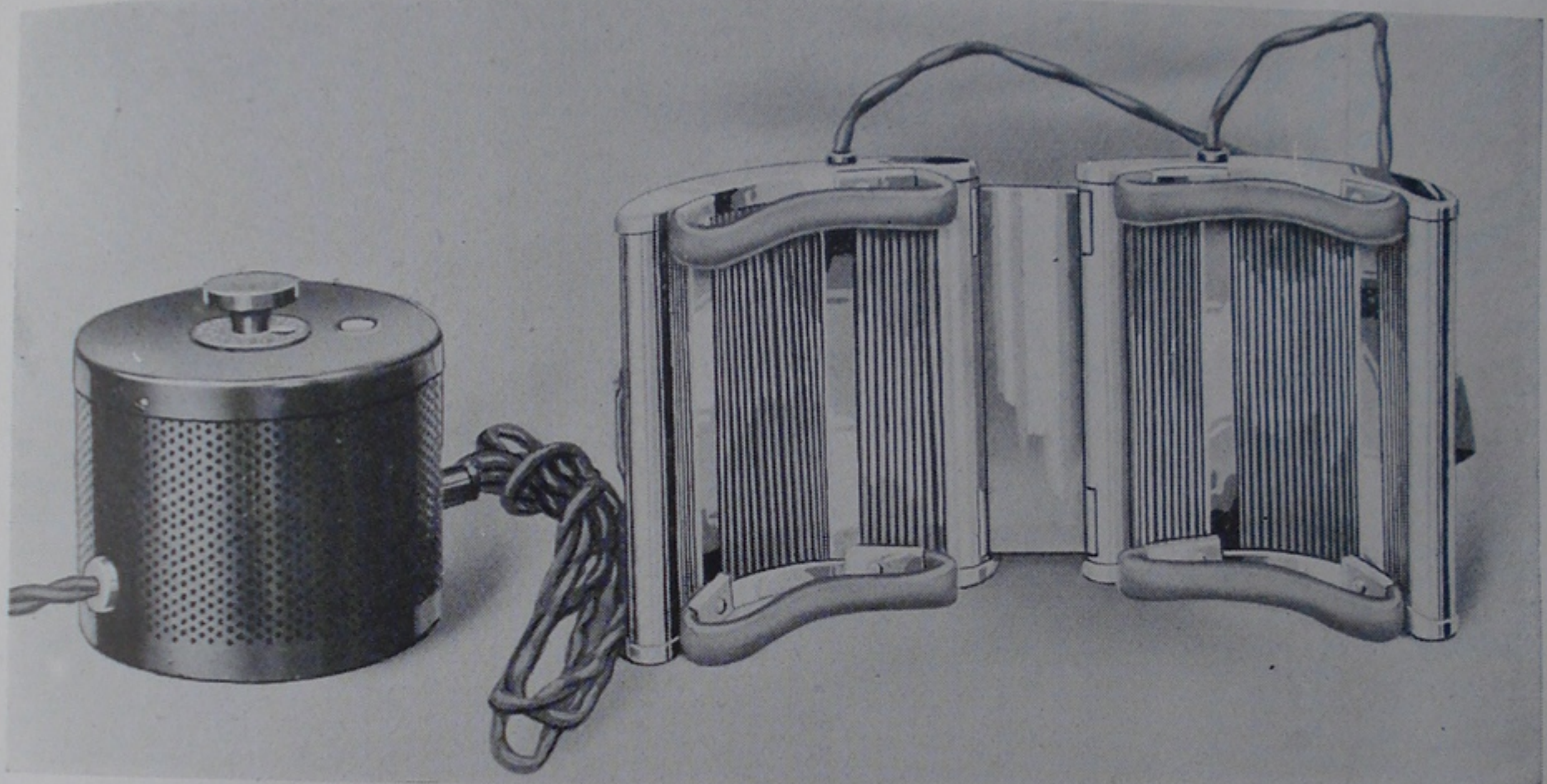
The Compress series of Infra-red Generators are adapted for either office, home or institutional practice.

They are provided with accurately calibrated Potentiometers with "pilot lamp." The Potentiometer enables the operator to control the temperature and regulate the technique in any particular case.

The Compress Generators are constructed with the well-known Burdick continuous "hollow wedges" for maximum Infra-red Ray production.

Thermal insulation protects body of patient from contact with the metal parts and gives perfect comfort while holding the Compresses in proper position.

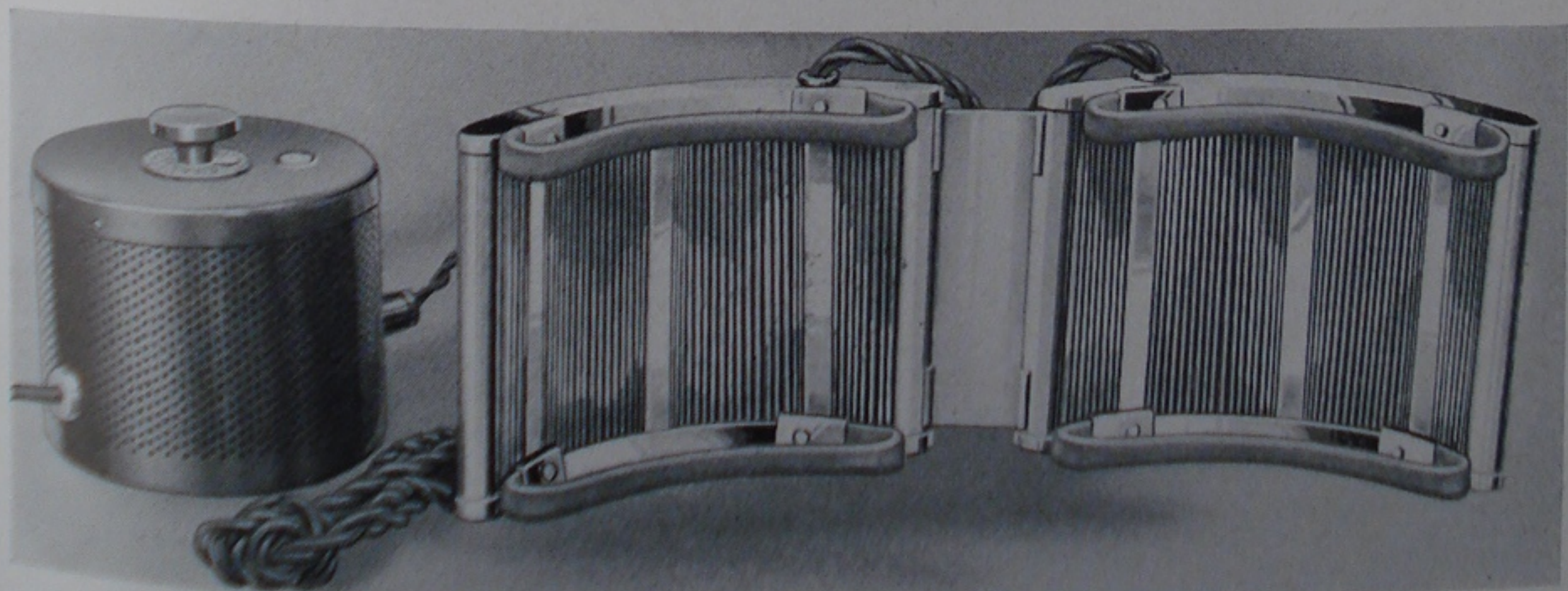
The entire construction of Compresses is of aluminum, insuring lightest possible weight compatible with high efficiency.



Burdick Infra-red Compress No. C-1

13 $\frac{3}{4}$ "x6"

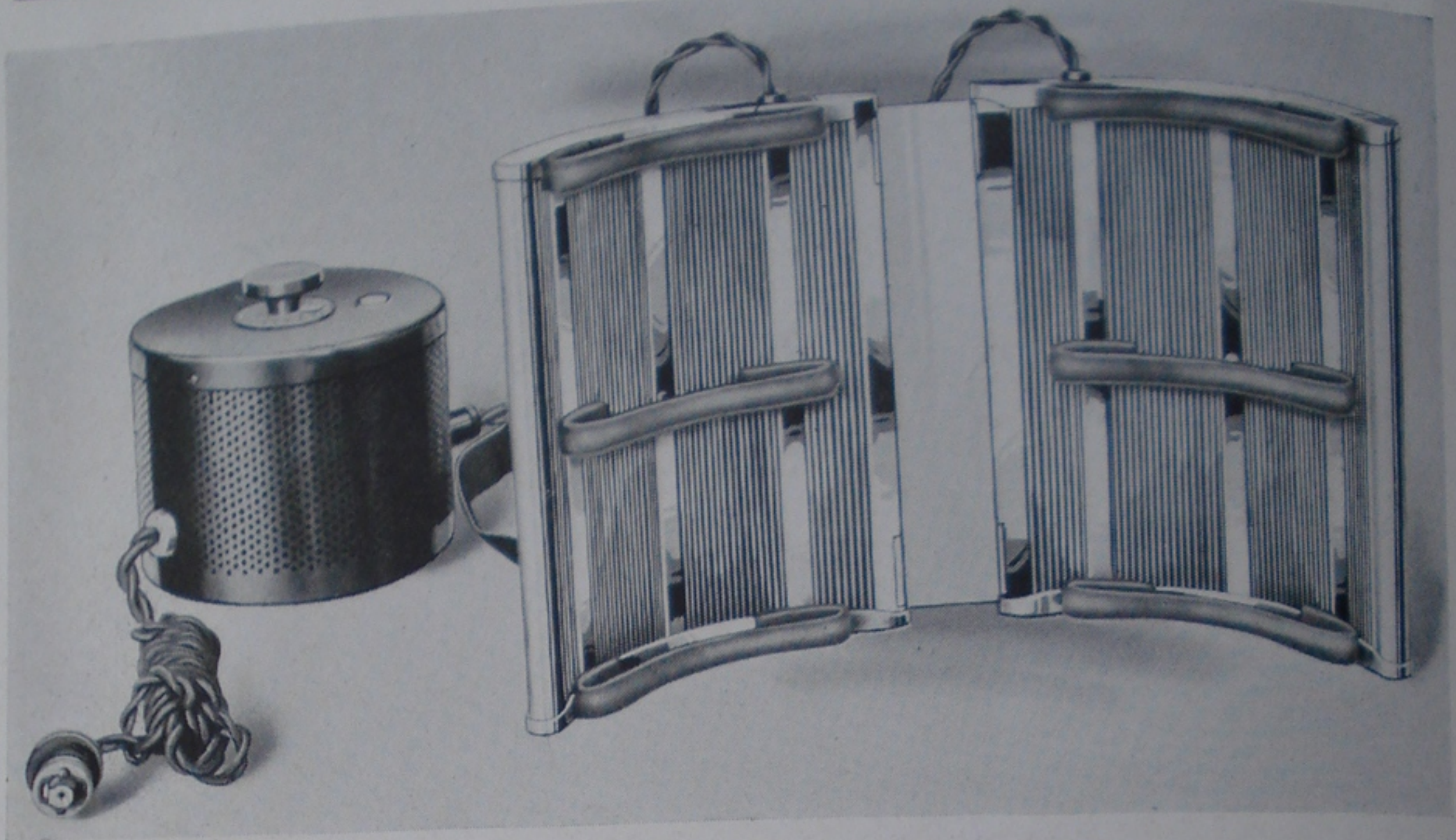
For application to ankle, wrists, hands and smaller members.



Burdick Infra-red Compress No. C-2

18"x6"

For application to lower limbs, shoulders and medium sized extremities.



Burdick Infra-red Compress No. C-3

18"x10"

For application to chest, pelvis, back, thighs and other larger portions of the body.

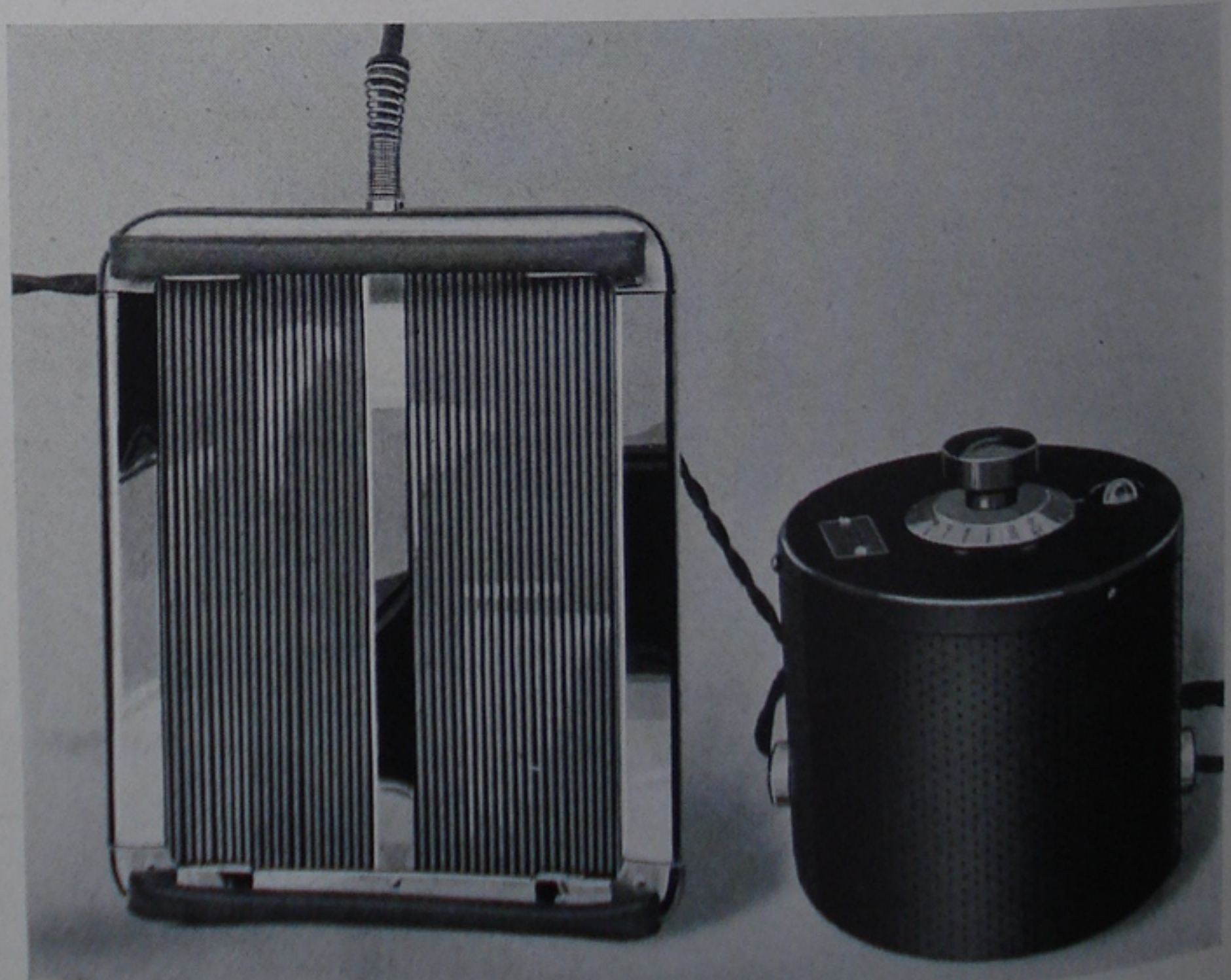
The Burdick Infra-red Compress No. 3 is perhaps the most popular generator of the entire Compress Series, due to its wide range of adaptation to all members of the body, from the smallest to the largest—particularly to the pelvic region, the abdomen, and the lumbar and sacral areas of the back.

Infra-red Generator P-53

This member of the pad series is unlike the P-50, P-51 and P-52 in that it is operable from the potentiometer, has soft rubber supports and a polished metal finish for office treatment work.

The other pads, being equipped with special thermostatic control and eiderdown covers, are peculiarly adapted to prescription use in the home, under the personal direction of the physician.

As the applicator shown in the illustration weighs only a few ounces, it is a most convenient device for making thermal applications to chest, back, pelvis, etc.



Burdick Infra-red Generators (Pad Type)

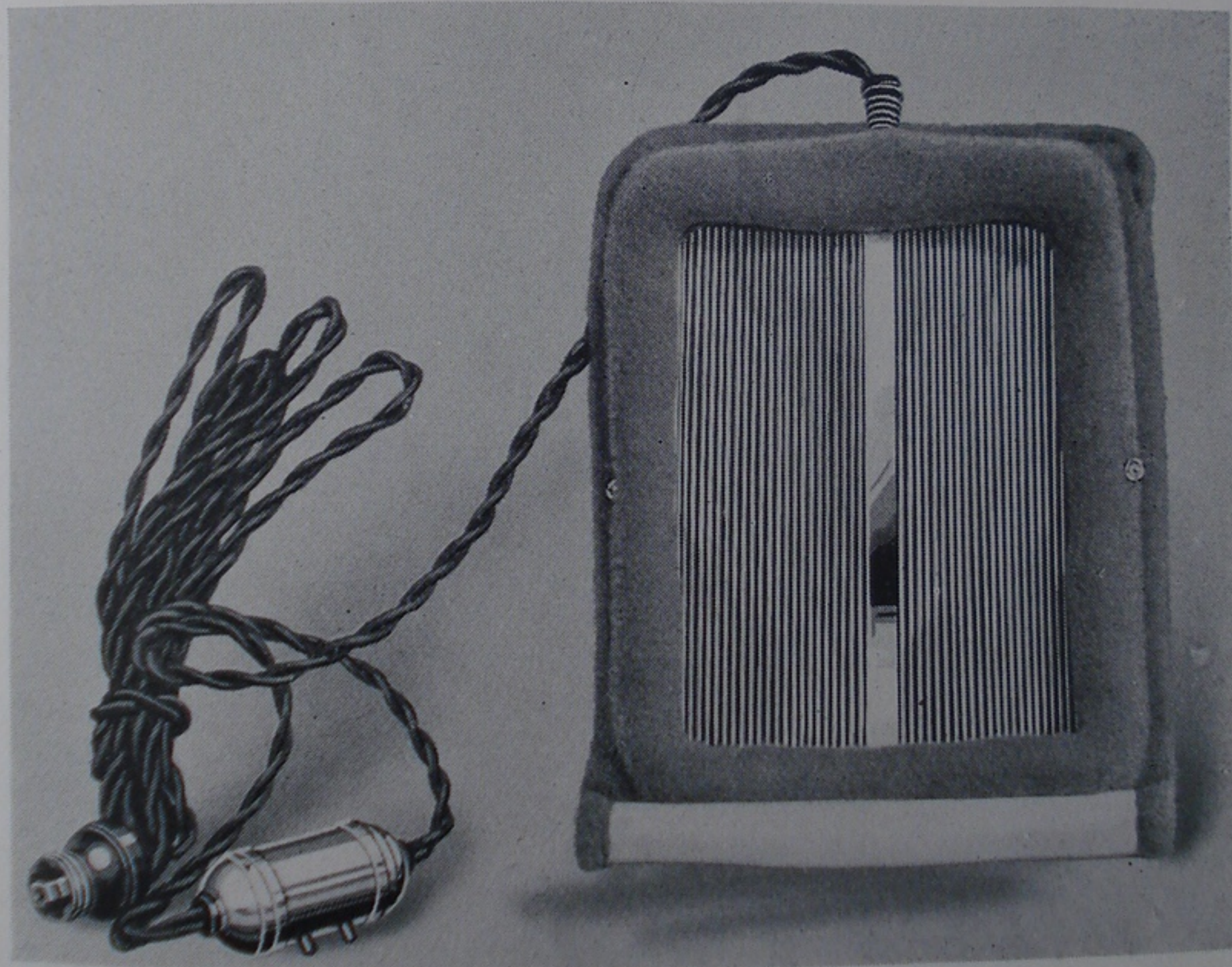
The Infra-red Generators (pad type) are intended especially for physicians' prescriptions for use in the homes of patients.

They are provided with Burdick "Black Body" continuous wedges, thermostat, absolute thermal control, and an off and on switch.

This series of Generators is adapted for application of the Infra-red Rays to all parts of the body, but without the continuous support or Potentiometer control provided in the Compress series.

The Pad Generators are constructed with a radius to fit contours of different portions of the body and flexible support. There is a lamb's wool cover for the most perfect adaptation, and comfort to the patient.

Where mere heat applications are desired the flap on the No. P-50 Generator (pad type) may be buttoned down over the "black body" wedges, thus forming a heating pad.

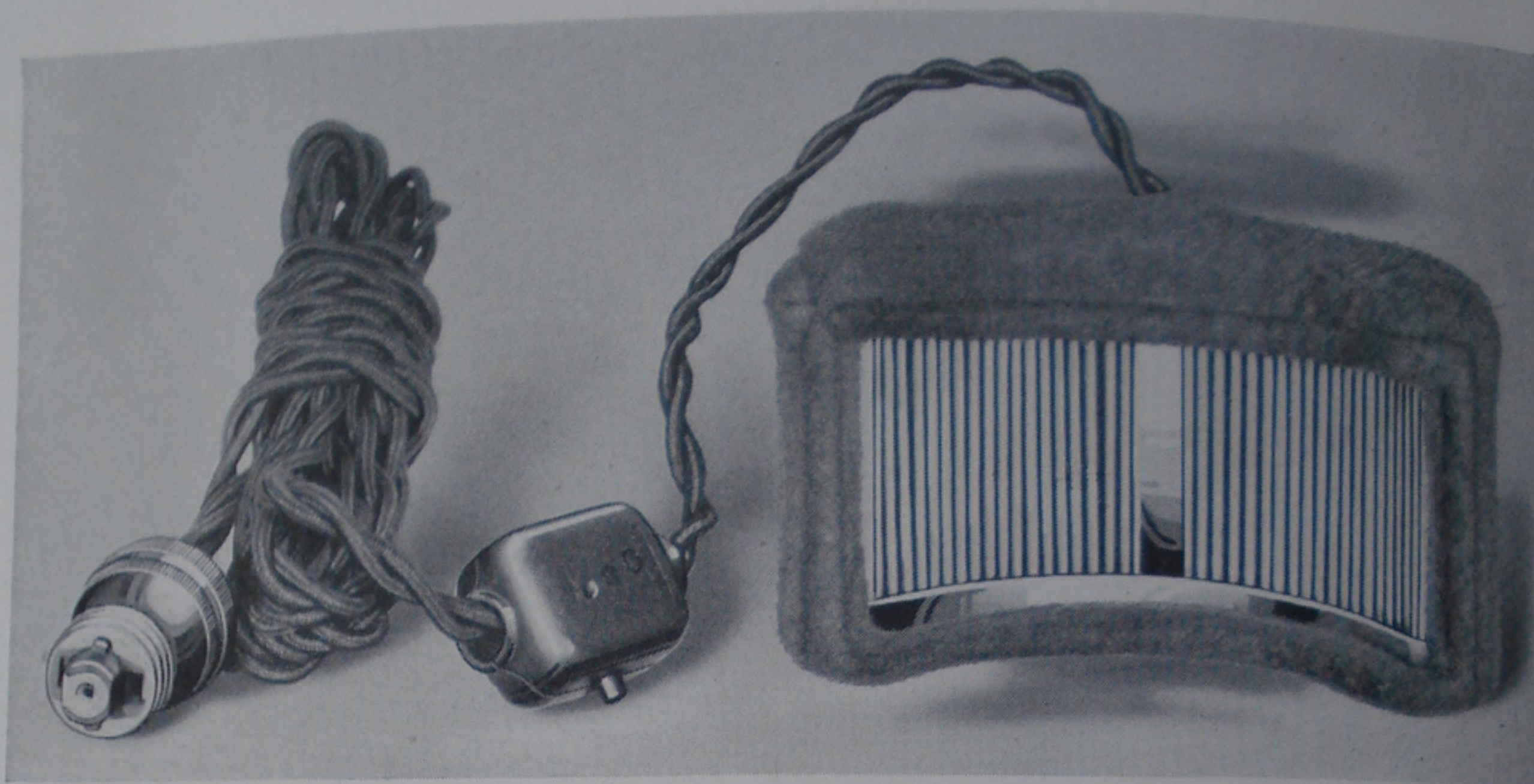


Burdick Infra-red Generator (Pad Type) No. P-50

8"x10"

The vertical black lines in the front of the Generator illustrate the "black body" principle of the continuous wedges of these Generators.

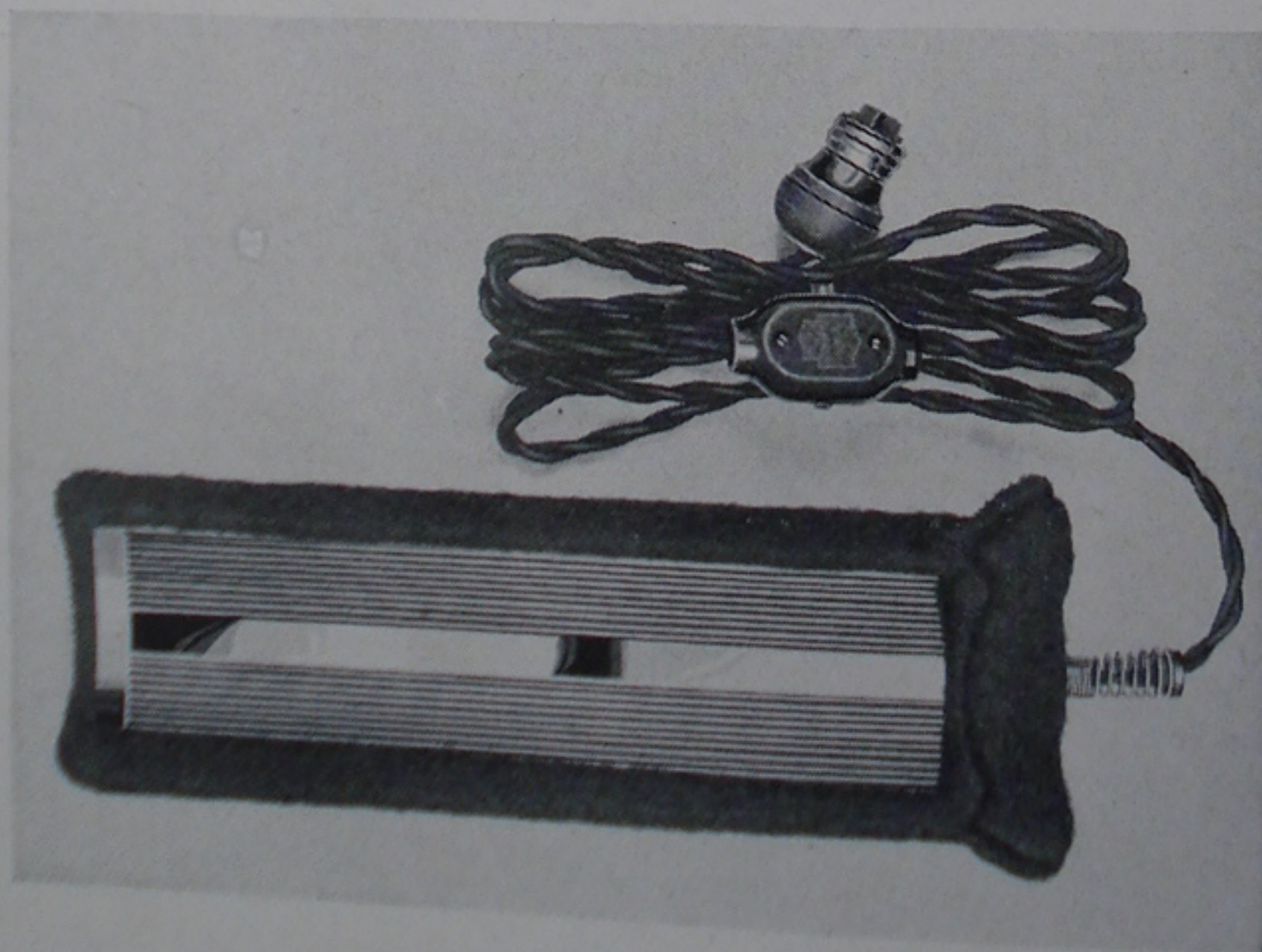
The flap is turned over on the back of the Generator, exposing the "black body" surface for Infra-red application.



Burdick Infra-red Generator (Pad Type) No. P-51

4"x6"

For application to throat, frontal sinuses, mastoids eyes, etc.



***Infra-red Spinal
Applicator P-52***

Those familiar with the benefits, both tonic and sedative, of hot and cold fomentations or hot steam compresses to the spine will readily understand the importance of this Infra-red spinal pad. Only twelve inches in length, it is applicable, separately, to the cervical, dorsal and lumbar sections of the spine for definite local effects—without involving other portions.

The spinal pad is equipped with reliable thermostatic control and an eiderdown cover.

Burdick Infra-red Orificial Instrument Series

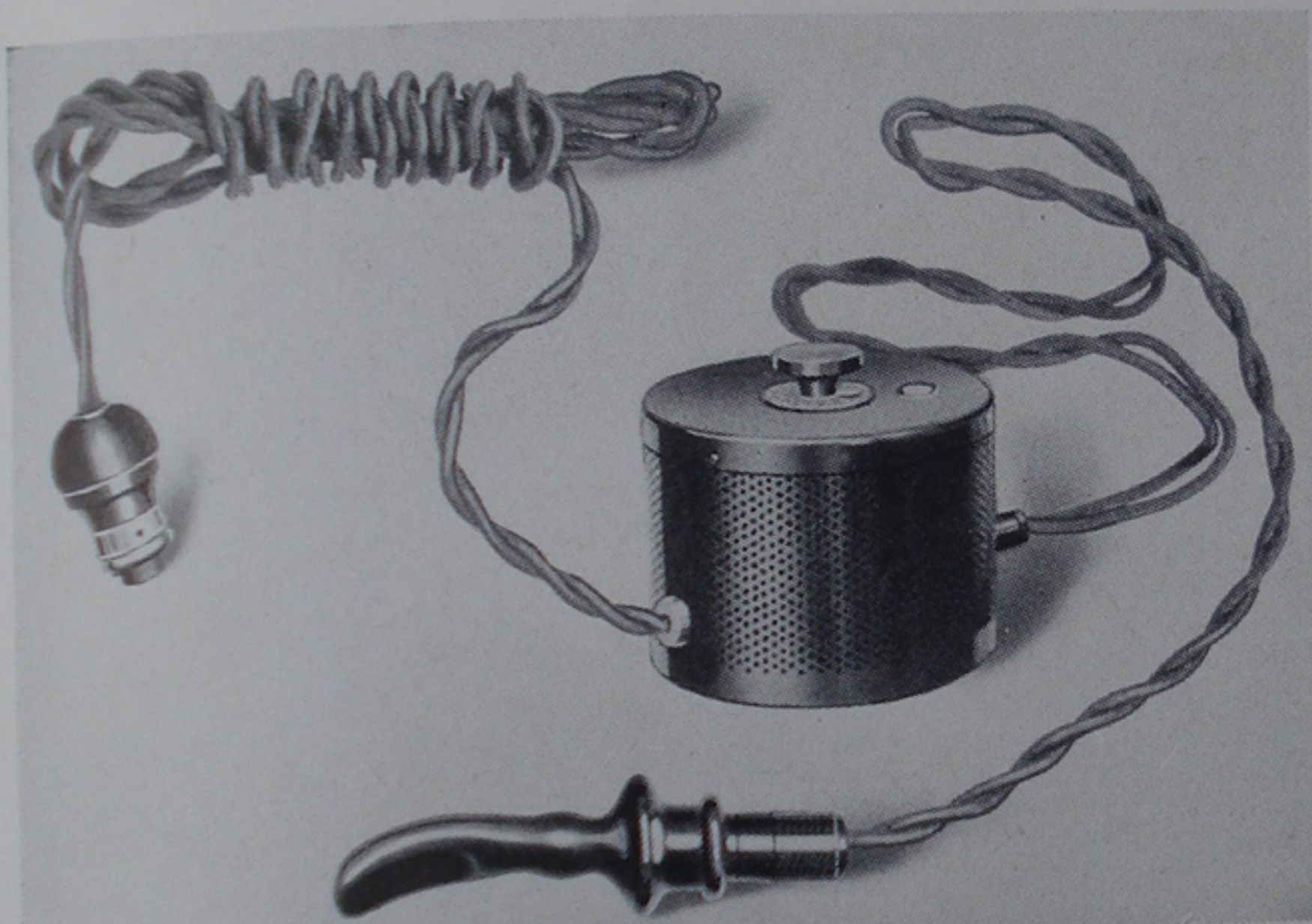
The Burdick Infra-red Instruments provide the most satisfactory method yet obtained for administering Stimulation, Radiation and Bactericidal action to the Genito-Urinary, Rectal, Nasal and Aural Orifices for relief of chronic or acute inflammatory, catarrhal and infectious conditions.

Each class of instruments has been designated of special shape to fit it particularly for application of the Infra-red to its respective field.

An accurate Potentiometer provides positive control for administration of Infra-red Rays for specific effects—tonic, sedative, or bactericidal—desired in any particular case.

The entire Orificial Instrument series is operable interchangeably from the Potentiometer.

The internal applicators of this series, as shown in experimental tests illustrated by diagrams Nos. 4 and 8, are transparent to the Infra-red Rays and serve as the best transmitters of the rays for Orificial application.



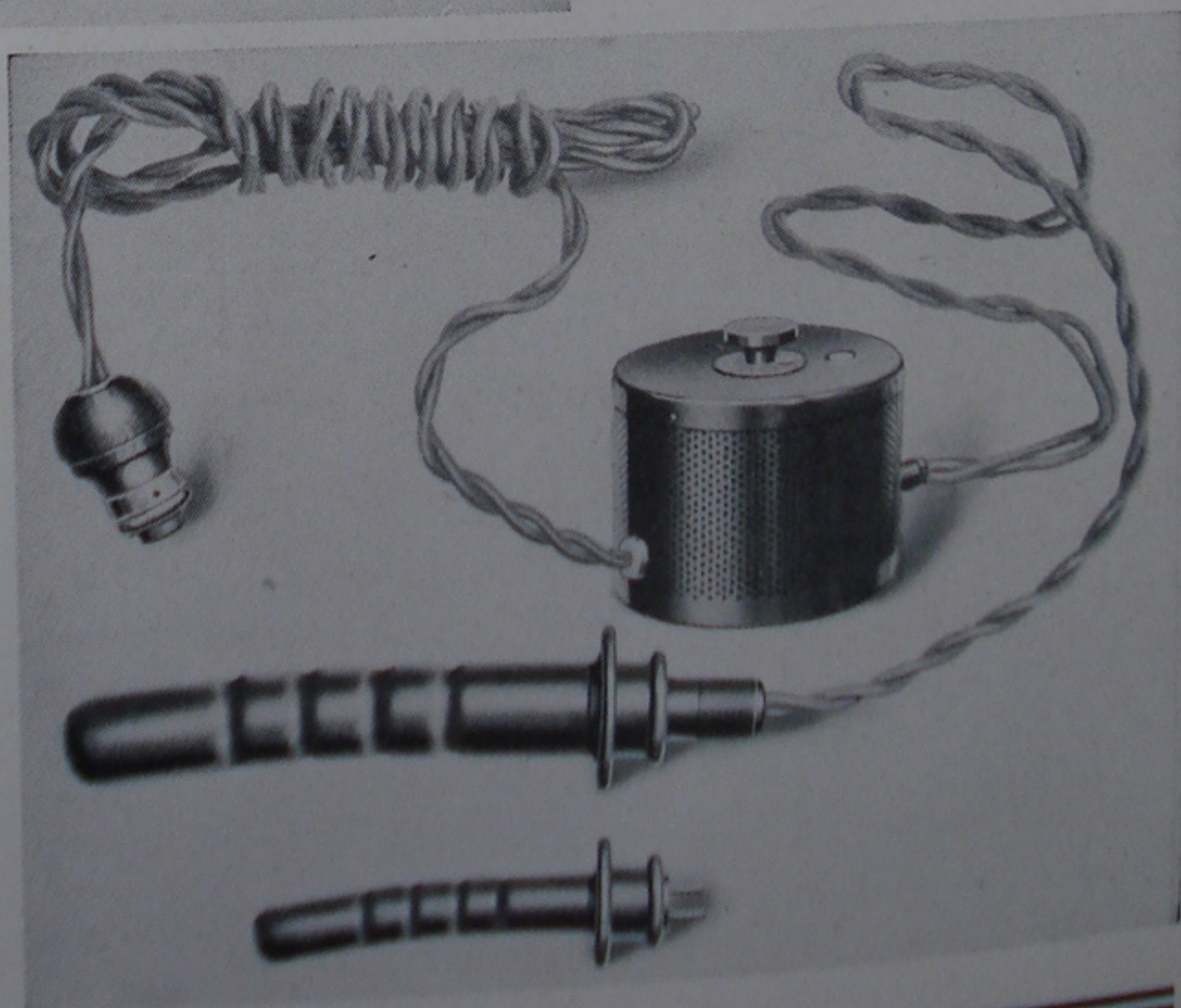
***Burdick Prostatic
Infra-red Generator
G-U. 4***

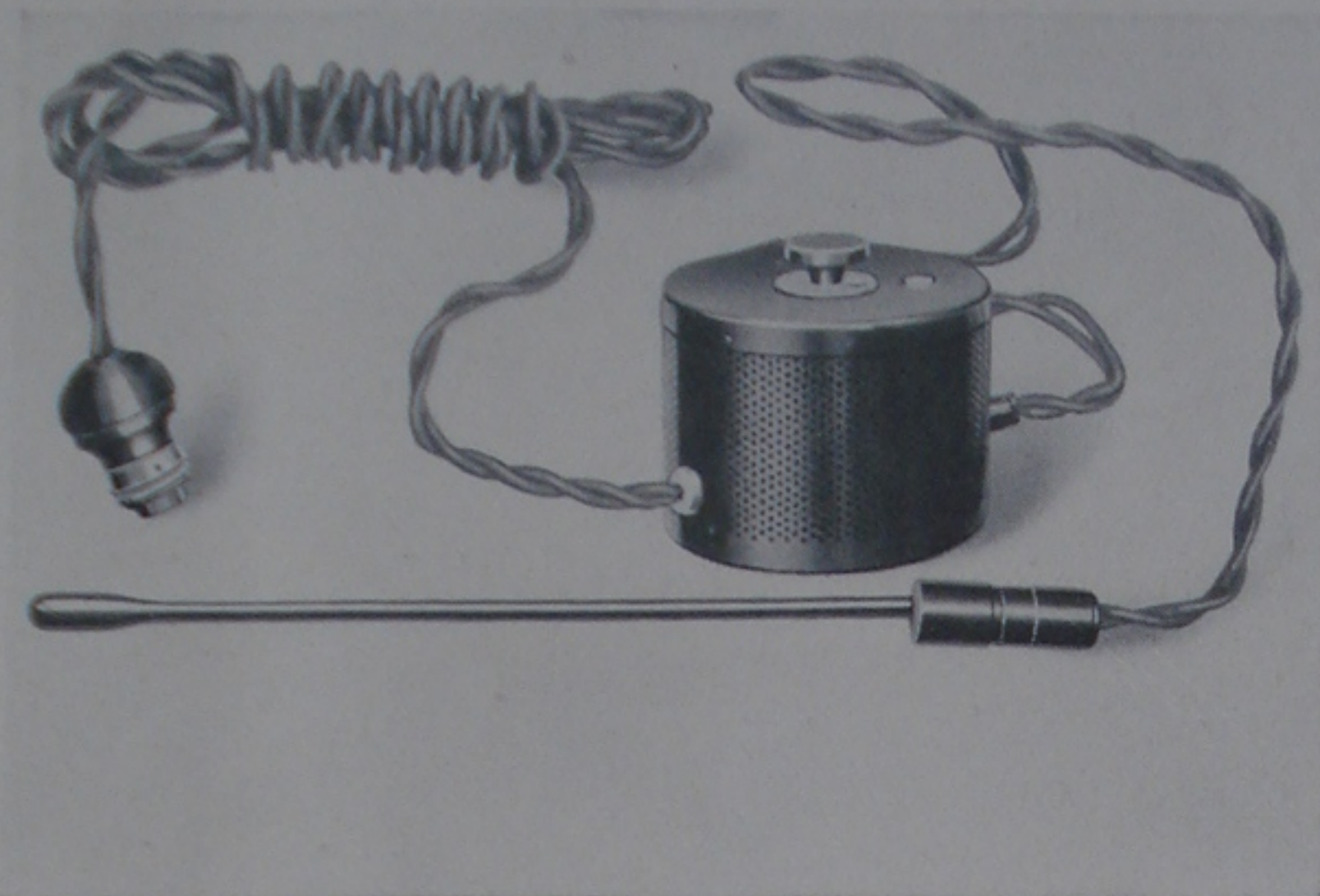
Note the correct anatomical shape for retention of the Generator by the sphincter muscle in direct contact with prostatic area.

Also note the special concave shape of body of generator.

***Burdick Vaginal
Infra-red Generators
G-U. 10 and 12.***

Note the special corrugations in body of the Generator to facilitate retention by the vaginal rugae.





**Burdick Colonic
Infra-red Generator
O-D 4**

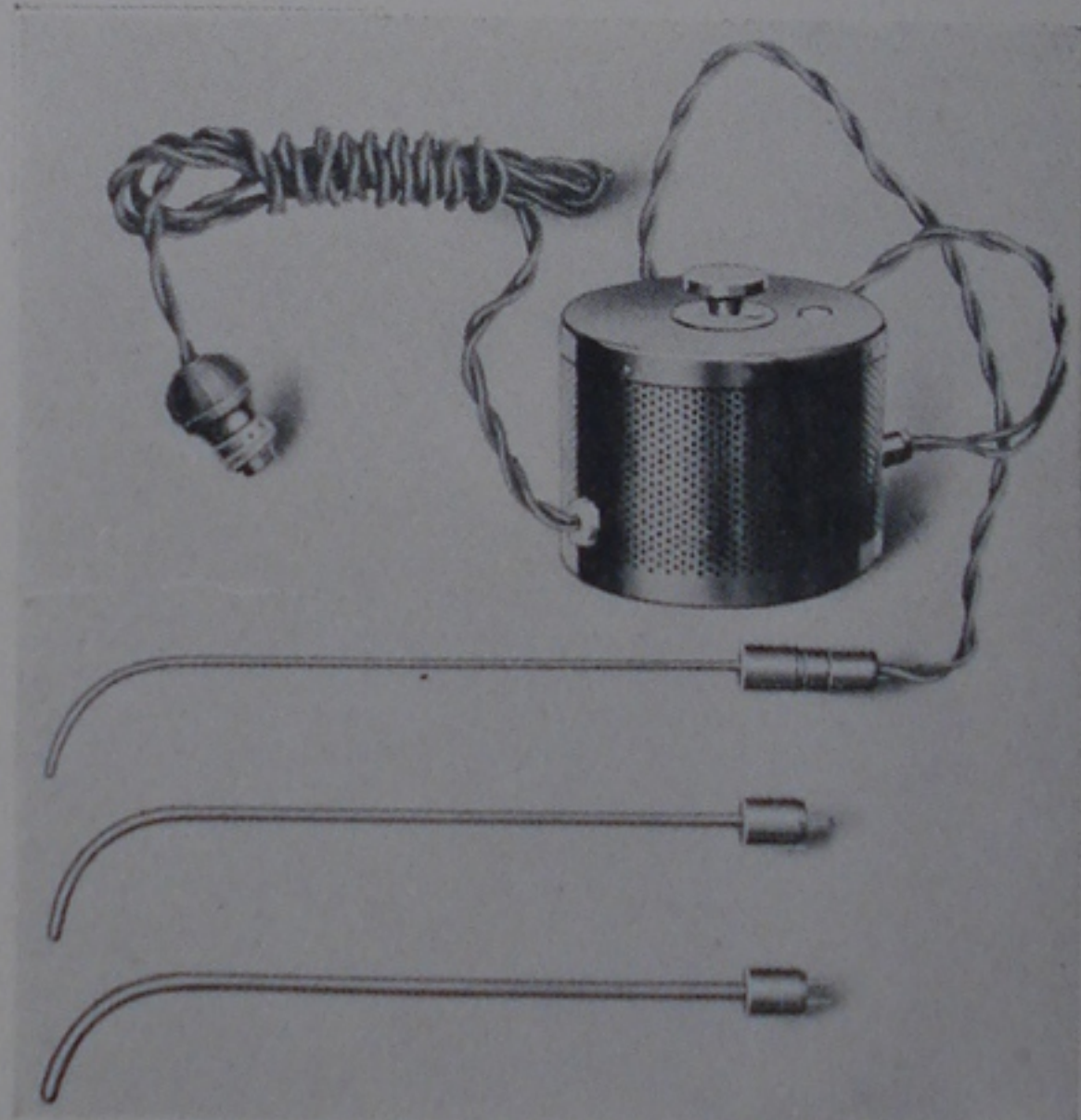
Up to the time of the invention of the sigmoidoscope, no diseases offered more difficulty than those affecting the lower end of the colon, from the sigmoid flexure to the rectum.

The Burdick Colonic Infra-red Generator is entered through the sigmoidoscope and applied directly to the excoriated or denuded epithelium and by its sedative and tonic action and the healing hyperemia induced enables the physician to show results not hitherto obtainable. It is best applied in the genu-pectoral position.

**Burdick Urethral
Infra-red Generator
Series G-U. 1, 2 and 3**

It is worthy of note that few individuals possess normal urethras. A large percentage of men have had specific urethritis leaving a more or less irritated condition of the genito-urinary tract and this series is admirably applicable to the irritated mucosa, bringing it to a condition of normalcy in the shortest possible time.

As it is furnished in three sizes (17-5 2/3 mm; 21-7 mm; 26-8 2/3 mm.) it furnishes an excellent modality for the treatment of severe strictures and Impotentia Coeundi incident to that condition. The fact that the generator is heated to a point slightly above body temperature facilitates the entrance of a larger size than could normally be used.

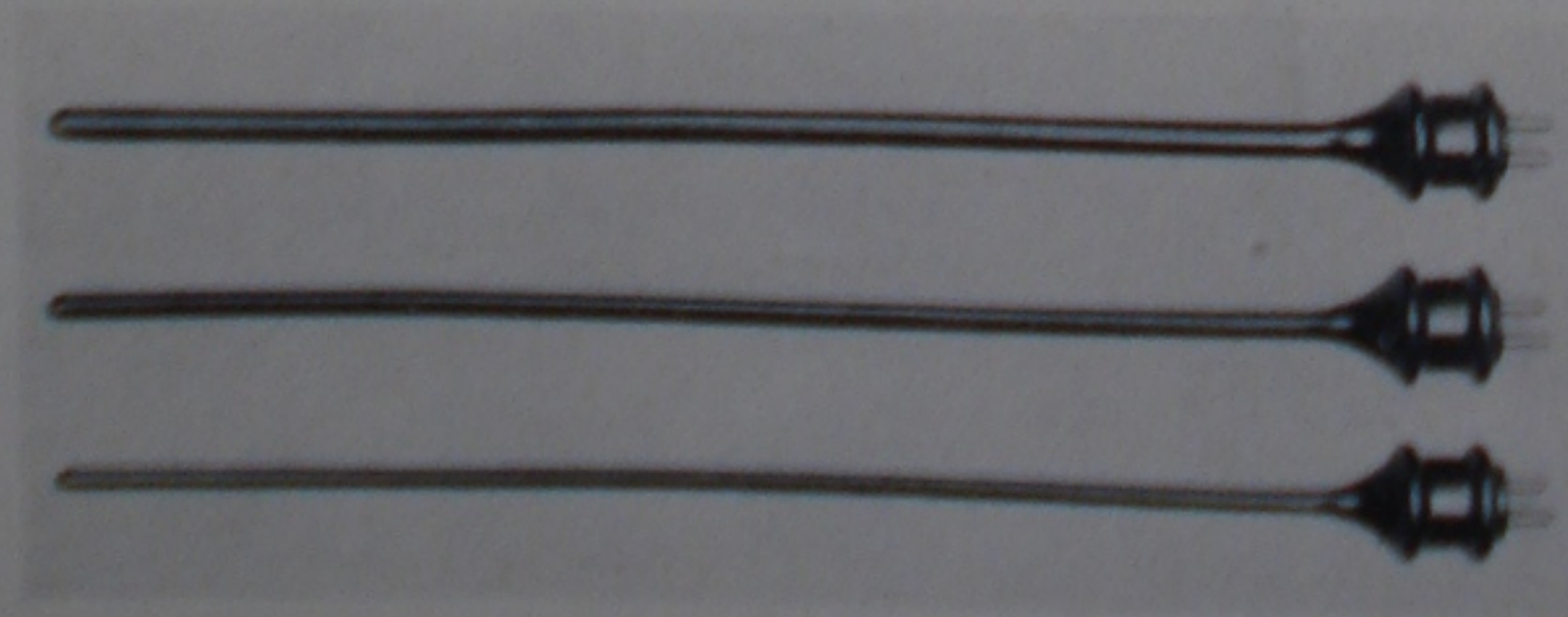


**Nachtigal Cervix
Infra-red Generator
G-U 13, 14 and 15 Series**

This series of instruments, designed by Dr. H. Nachtigal of Chicago, furnishes a practical and effective means of relieving leukorrhea and allied infections and inflammations of the cervix.

The moderately heated instruments may be passed readily into position directly in contact with the infected surfaces.

The potentiometer provides accurate control of temperature administered to the degree desired for stimulation, sedation or thermal bactericidal action.

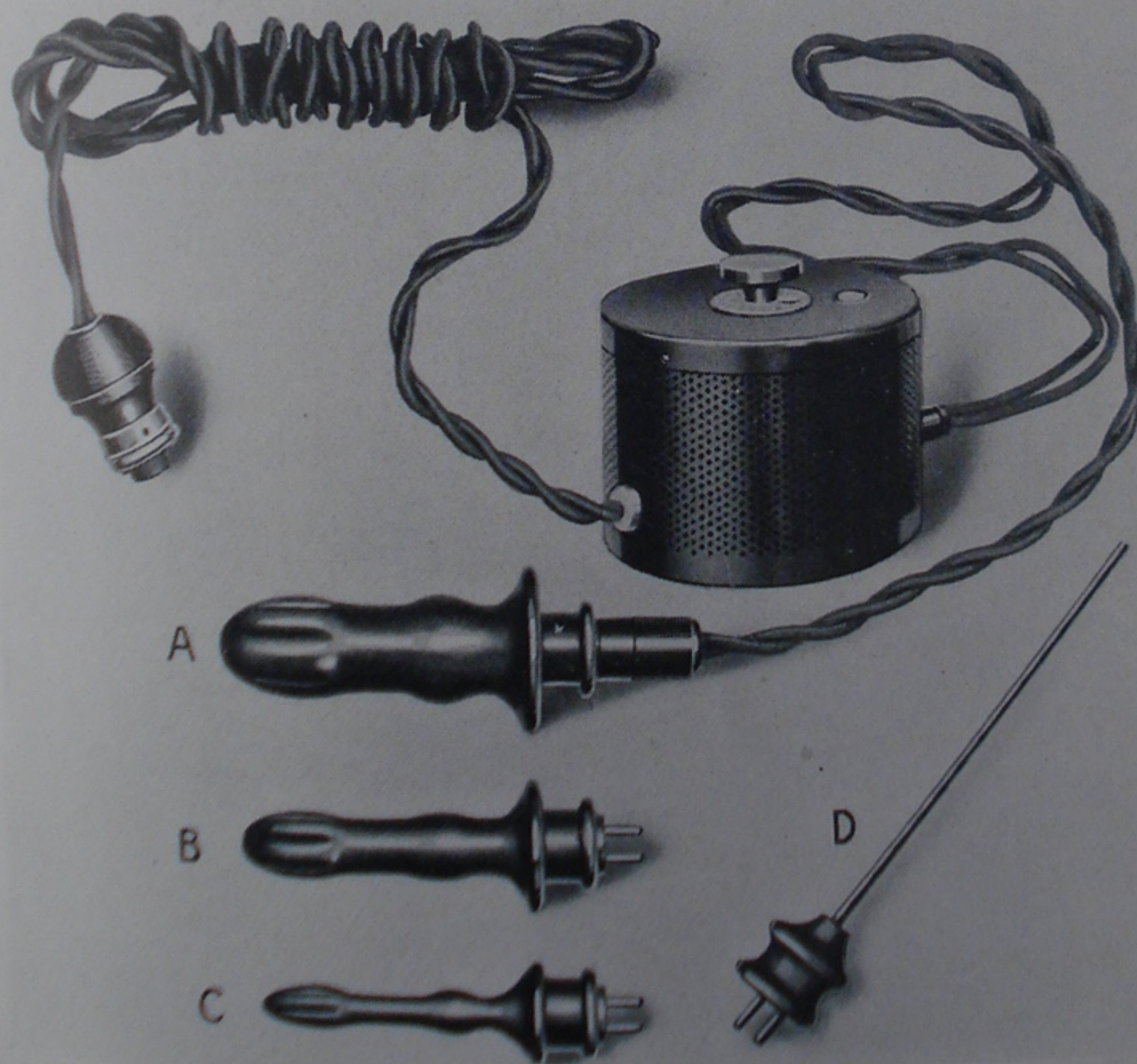
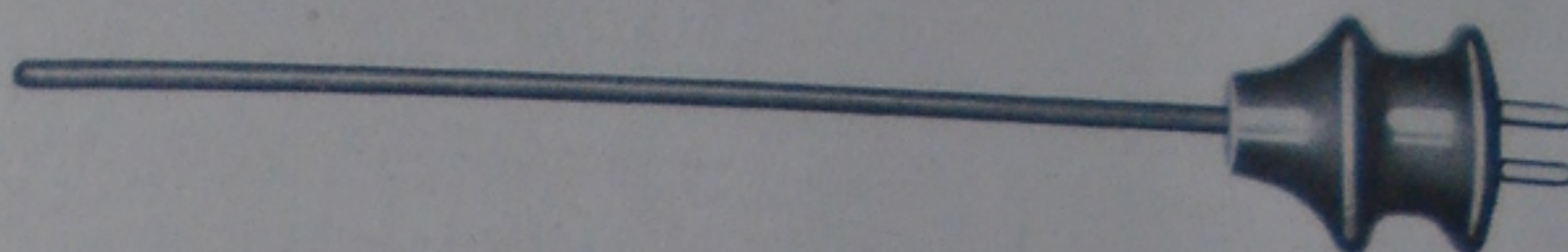


The Cervix applicators are of three sizes: 17 (American gauge)—3 2/3 m. m.; 21—7 m. m.; 26 8 2/3 m. m.

The Storke Fistula Applicator. OD-5

Albert French Storke, M. D., Chicago, designed this important Infra-red instrument as a practical and efficient means of combatting rectal fistulae so difficult to treat by ordinary methods.

The use of this applicator is perhaps just as important in relieving other antrum infections as in rectal work. It is, in fact, recommended for all cases where heat applications, under positive control by means of a delicate flexible (though strong) needle applicator, to superficial or deep tissue cavities, are desired.



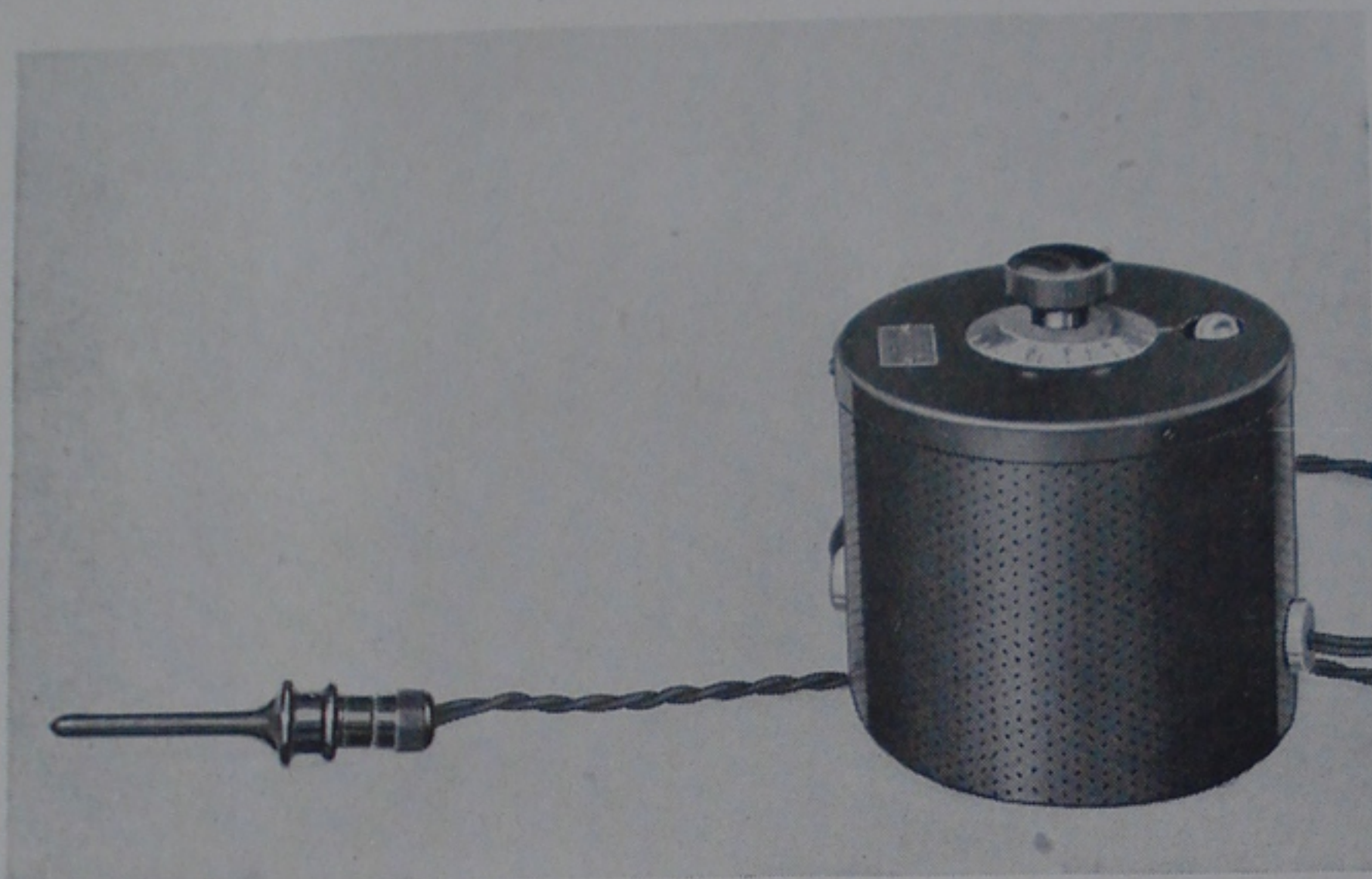
Burdick Infra-red Rectal Dilator Series O. D. 1, 2 and 3

- (A)—For maximum rectal dilation.
- (B)—For moderate rectal dilation.
- (C)—For infantile rectal dilation.
- (D)—The Storke fistula probe.

It has often been demonstrated that rectal dilation, carried out under a higher than normal temperature, permits of easy, painless entrance. This is an important consideration as a multitude of diseases hinge upon tight or contracted sphincter ani.

The Burdick series of three Infra-red rectal dilators has proved of particular value in relieving all pathological conditions of the rectum and adnexa and, by its sedative and stimulative action through the sympathetic nervous system, has relieved many untoward conditions of both sexes.

Infra-red Nasal Applicator. NA-1



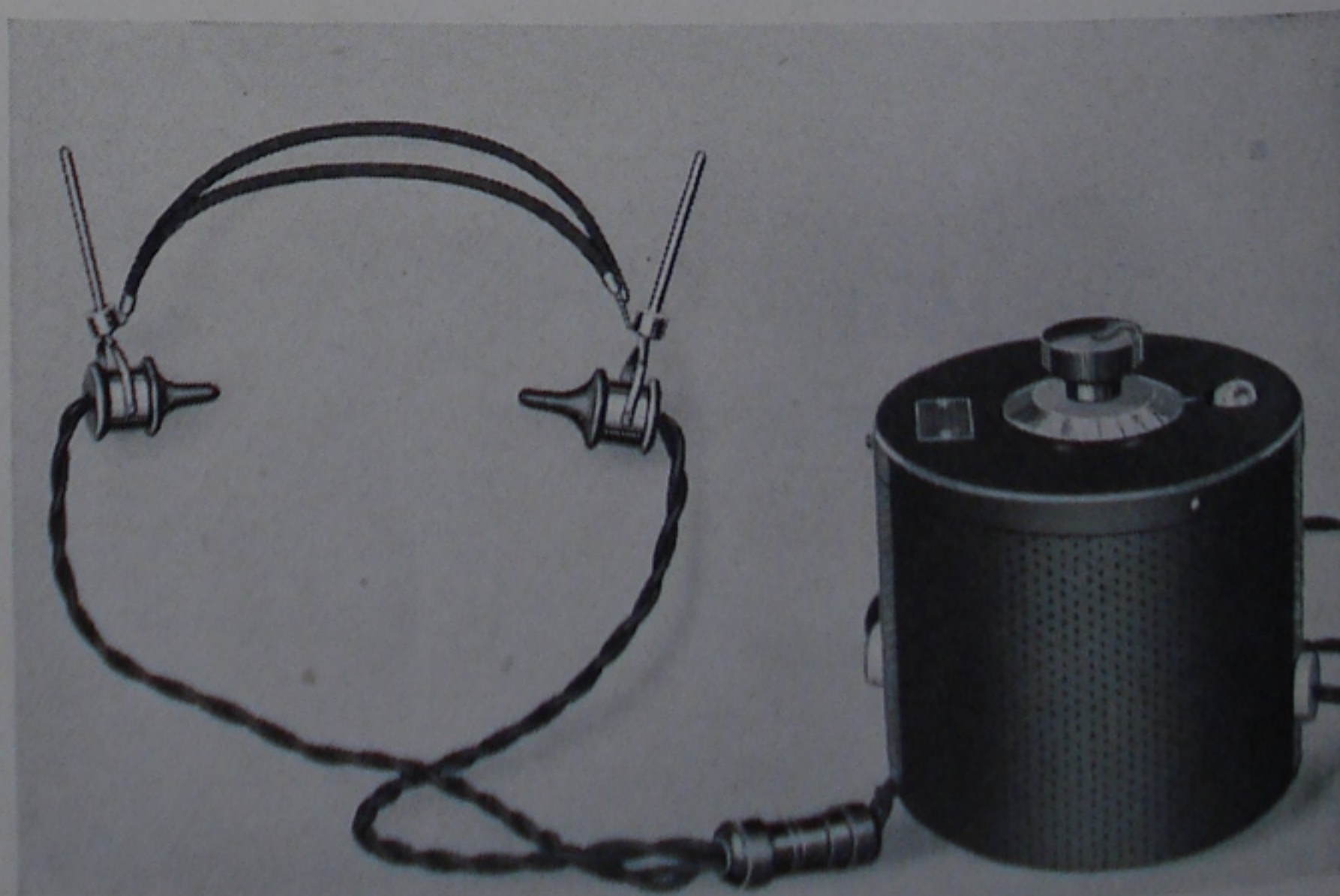
This splendid little instrument was designed and used in practice by George Starr White, M.D., N.D., D.O., Ph.C., Ph.D. LL.D., etc., for more than a year with excellent results before it was put into commercial production.

In all anterior and nasal inflammations and infections it is of the greatest value, either when used alone or when used as an adjuvant to other treatment.

Aural Infra-red Applicator. OA-1

The applicator tips are so designed as to afford both comfort and effectiveness in the use of these delicate instruments.

The wide adjustment range of the instruments permits their application with perfect comfort to every patient regardless of skull conformation. The flat spring supports hold the applicators firmly but gently in position during the treatments without further attention from the nurse, after adjustment to correct position has once been made.



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Books Recommended by Us Covering the Foregoing Subjects

| No. | | Code | Price |
|------|--------------------------------------|---------------|--------|
| 650 | —Eberhart—High Frequency Manual..... | <i>Expert</i> | \$4.00 |
| 1702 | —Grover—Electro-Therapy..... | <i>Ingrov</i> | 4.00 |
| 1703 | —Saberton—Diathermy..... | <i>Insabe</i> | 2.25 |
| 1737 | —Cumberbatch—Diathermy..... | <i>Incumb</i> | 6.00 |
| 1748 | —Grover—High Frequency Practice..... | <i>Match</i> | 4.00 |